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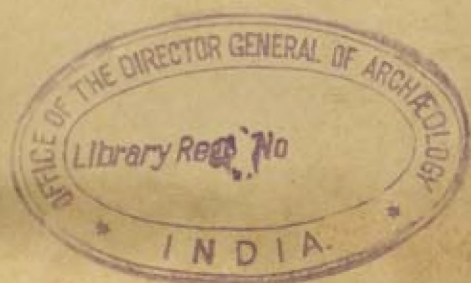
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THE
JOURNAL
OF THE
ROYAL GEOGRAPHICAL SOCIETY.

VOLUME THE THIRTY-FIRST.

25238



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1861.

EDITED BY DR. NORTON SHAW.



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Royal Geographical Society,

1861.

REPORT OF THE COUNCIL,

READ AT THE ANNIVERSARY MEETING ON THE 27TH MAY.

The Council, in submitting their Annual Report of the financial state and progress of the Royal Geographical Society, are happy in being enabled to congratulate the Members on its continued prosperity and extended usefulness.

Members,—Ordinary, Honorary, and Corresponding.—The accessions to the Society since the last Anniversary amount to the unprecedented number of 233 Fellows. During the same period the Council have to record the decease of 30 Ordinary Members, and 2 Corresponding, viz., Le Chevalier Pedro de Angelis, of Buenos Ayres, and M. Daussy, of Paris.

The Society now comprises 1510 Fellows, and 54 Honorary and Corresponding Members.

Finances.—The accounts of the past year show an increase of receipts proportionate to the growth of the Society, without any corresponding increase of expenditure, which has been kept fully within the estimates submitted to the last Meeting: the Council have therefore been enabled to add 500*l.* Stock to the permanent fund of the Society, which now amounts, inclusive of a further purchase since the close of the year, to 5000*l.* New 3 per Cents.

Publications.—The 30th volume of the Society's Journal, edited by Dr. Shaw, and containing 15 maps and illustrations, has been issued to the Fellows.

Volume 4 of the 'Proceedings,' and Nos. I. and II. of Vol. 5, likewise edited by Dr. Shaw, have also been completed. Copies

of these publications have been duly presented to the leading Scientific Institutions, Home and Foreign, to the list of which have been added the Cheetham Library of Manchester; the Liverpool Literary and Philosophical Society, and Mercantile Marine Association; Société d'Encouragement pour l'Industrie Nationale de Paris; Department of Public Instruction, Upper Canada; and the publishers of Silliman's American Journal.

Map-Rooms.—The accessions to this department since the last Anniversary comprise 1150 maps and charts, and 18 atlases, all of which have been arranged in due geographical order. The following may be specially noticed, viz.:—Ordnance Maps of England, Wales, Scotland, and Ireland, on various scales; Charts by the Hydrographic Department of the Admiralty, accompanied with books of Pilotage, &c.; Government Maps of Norway, Sweden, Denmark, Saxony, Bavaria, and the United States of America; Rogers and Johnston's Atlas of the United States; the Quadrant Atlas by Sir H. James; sundry native Japanese maps and drawings, presented by Mr. Rutherford Alcock; a synchronous map of the British Isles, by the Board of Trade; maps of Norway, Sweden, and Denmark, by Captain C. Schwenzen; Swiss Cantons of Genève, Vaud, Neuchâtel, Fribourg, and Graubündten; route map of British India, by Capt. R. Sprye, &c.; Russian map of Northern Asia; coasting map of China, from Canton to Peking, by W. S. Sherwill; Equatorial Africa, showing Du Chaillu's route; Canada, by Devine; Rio Colorado of the West, by J. C. Ives, Top. Eng. U.S.; Central America, by Sonnenstern; Australia: Stanford's new map, showing recent discoveries; ancient map, by Abel J. Tasman, 1642; late discoveries, by J. McDouall Stuart; Geological Survey of Victoria, by R. C. Selwyn; Queensland, by L. F. Landsberg; Sketches from Flinders Range, by T. Burr; Otago (New Zealand), by J. T. Thomson; chart of North Atlantic Ocean, showing the soundings between Iceland, Greenland, and Labrador, &c., by Capt. Sir F. L. McClintock; Adriatic Sea, by Imray; storm and rain chart of North Pacific, by Maury; photographic views from the expeditions under Dr. Livingstone and Captain Speke; Atlases up to date, by Fullarton, Johnston, and the proprietors of the 'Dispatch'; Blackie's and Black's Atlases complete.

Instruments.—The Prize of 50*l.*, or a Gold Medal, to the designer or maker of the most serviceable Reflecting Instrument for the measurement of angles, is still open for competition. Specifications may be obtained at the office of the Society. A valuable set of instruments has been supplied to Consul Petherick, with books and forms, to enable him to make and register observations on his proposed journeys towards the sources of the White Nile. Instruments have also been furnished to our Medallist Dr. Rae, now engaged in an excursion through Canada towards the Rocky Mountains.

Library.—The additions to this department since the last Anniversary comprise 1050 books and pamphlets, including 140 volumes by purchase. Among these may be noticed Atkinson's 'Regions of the Upper and Lower Amur;' Du Chaillu's 'Equatorial Africa;' Beke's 'Sources of the Nile;' M'Culloch's 'Geographical, Statistical, and Historical Dictionary;' Raverty's 'Afghan Dictionary and Grammar;' Tchibatcheff's 'Asie Mineure;' Middendorff's 'Siberische Reise;' Bollaert's 'New Granada, Equador, Peru, and Chile;' Raleigh's 'History of the World;' Tennent's 'Ceylon;' Bowring's 'Philippine Islands;' Hadfield's 'Brazil, River Plate, and Falkland Islands;' Trollope's 'West Indies;' Maury's 'Physical Geography of the Sea;' Bohn's 'Handbook of Geography;' Bagster's 'Bible of Every Land;' Dunlop's 'Hunting in the Himalaya;' Richardson's 'Polar Regions;' Mackay's 'Manual of Geography;' Burton's 'Central Africa;' Petherick's 'Egypt, the Soudan, and Central Africa;' Della Marmora's 'Itinéraire de l'Île de Sardaigne;' Marsden's 'Marco Polo;' Staunton's 'Embassy to China;' Leake's 'Numismata Hellenica;' &c. &c.; and the Transactions of the principal Literary and Scientific Institutions throughout the world.

Expeditions.—The progress of the expedition under Captains Speke and Grant in Eastern Africa, the discoveries of Mr. McDonall Stuart in Central Australia, and the travels and researches of our Medallist Dr. Livingstone, have been duly reported to the Society. The expedition under Consul Petherick, towards which a sum of nearly 1200*l.* has been subscribed by Members and others, has also started for the White Nile, to meet

and assist with supplies the expedition from Zanzibar, under Captains Speke and Grant. The exploration also of M. Du Chaillu in Western Equatorial Africa and the "Gorilla" district has engaged much attention, and the specimens of natural history brought by him have been submitted, at the Rooms of the Society, for the examination of the Fellows and their friends. The 'Proceedings' may be referred to for farther interesting geographical notices.

Royal Premium.—The Founder's Medal has been awarded to Capt. John Hanning Speke, of the Indian Army, for his eminent geographical discoveries in Africa, his prudence and intrepidity as a traveller, and more especially for the discovery of the great lake Victoria Nyanza, as illustrated by the map constructed for the Journal of this Society; and, lastly, for the zeal with which he undertook and is now carrying out, at the instance of the Society, the determination of the northern limits of the Lake Victoria Nyanza, and the possible sources of the White Nile; and the Patron's Gold Medal to Mr. John McDonall Stuart, for his very remarkable explorations in the interior of Australia, and particularly for his last successful journey from South Australia to the waterparting of Northern Australia, as illustrated by his own maps.

House.—The evening meetings continue to be held, by permission of the Chancellor of the University of London and the Council of the Royal Society, at Burlington House, no other arrangement having yet been found practicable for the accommodation of the numerous members of the Society.

MEMORANDUM.

The following motion is recommended by the Council for adoption:—

Considering the very great inconvenience attending the present method of ballot at the crowded Evening Meetings, the impracticability of carrying round boxes to obtain the vote of each Fellow,

and the very small number of Fellows who take the trouble of voting as they enter the Hall :

Resolved—

- “ That the election of Fellows be entrusted to the Council ; it being understood that the names of the Candidates proposed, and of the Fellows duly elected, shall be regularly announced from the Chair at each ordinary Evening Meeting, and that the necessary alteration be made in the Bye Laws, Chap. II., Section 2, and that Section No. 3 be struck out.”

The following alterations of the Rules under Section 5 are unanimously recommended :—

1. That in Section 5, Paragraph 3, referring to the duties of the Honorary Secretary, after the words “ he shall make abstracts of all memoirs read before the Society,” the following shall be appended, “ and be the Editor of the Proceedings.”
2. That in Paragraph 5, referring to the duties of the Acting Secretary, the words “ and Proceedings ” be omitted.
3. That the following be inserted between the present paragraphs 4 and 5 : “ That in the event of the absence of either of the Honorary Secretaries, his duties shall be performed by such member or members of the Council as the President may appoint, or they may be delegated to the Acting Secretary.”

In the event of the Anniversary Meeting acquiescing in this recommendation of the Committee, it is further proposed as a Minute of Council,—

1. That all memoirs read before the Society on the Monday night, and all papers recommended for “ additional notices ” at the Council Meeting of that day, be forwarded to the address of the Honorary Secretary who is the Editor of the Proceedings on the Wednesday, to be returned by him on the Monday following.
2. That the Honorary Secretary should himself communicate with the speakers at the Evening Meeting, with the printers, and with the shorthand reporters.
3. That arrangements about advertisements and the distribution of the printed copies shall remain with the Acting Secretary and Office as heretofore.

BALANCE-SHEET FOR THE YEAR 1860.

Receipts.

	£.	s.	d.
Cash Balances	134	0	4
Treasury Grant in Aid of the Expedition to East Africa	2300	0	0
Subscriptions of 827 Fellows	1645	0	0
Compositions of 30 Fellows	758	0	0
Entrance Fees of 180 Fellows	540	0	0
Parliamentary Annual Grant	500	0	0
Sale of Publications, and Advertisements	189	6	8
Interest on Stock	123	8	9
Arrears of Subscriptions	74	0	0
Royal Premium Grant	52	10	0
Rent of Stables (less Assessed Taxes)	39	2	6
Returns of Sums charged in error	15	8	2
Subscriptions, &c., overpaid	12	16	0
	£6583	12	5

R. BIDDULPH, *Treasurer.*

Audited, 28th March, 1861.

T. H. BROOKING,
SHERARD OSBORN,
E. OSBORNE SMITH,
J. C. MARSHMAN,

*Auditors.**Balance-Sheet for the Year 1860.**Expenditure.*

	£.	s.	d.
East African Expedition .. .. .	..	..	2500 0 0
Salaries .. .. .	..	..	786 5 0
Publications—Journal and Proceedings .. .. .	..	..	675 2 3
Rent, Taxes, Wages, &c. .. .. .	..	..	691 1 4
Library and Map Rooms .. .. .	..	..	304 5 3
Office Expenses .. .. .	..	..	249 10 10
Petherick Expedition .. .. .	..	..	100 0 0
Gold Medals .. .. .	..	..	46 0 0
Humboldt Foundation in Prussia .. .. .	..	..	25 0 0
Subscriptions overpaid and returned .. .. .	..	..	11 0 0
Miscellaneous Charges .. .. .	..	..	10 0 11
Amount charged in error by Bankers .. .. .	..	..	7 18 0
Investment of 500 <i>l.</i> New 3 per Cents. .. .. .	..	..	460 17 6
Balance at Banker's .. .. .	..	£702	13 3
Cash in Office .. .. .	..	7	18 1
		710	11 4
		£6583	12 5

ESTIMATE FOR THE YEAR 1861.

Receipts.

Expenditure.

	£.	s.	d.		£.	s.	d.
Annual Subscriptions	1600	0	0	..	1100
Life Compositions	250	0	0	..	850
Entrance Fees	400	0	0	..	750
Arrears of Subscriptions	50	0	0	..	350
Sale of Publications	150	0	0	..	300
Royal Premium Grant	52	10	0	..	52
Parliamentary Annual Grant	500	0	0	..	50
Dividends on Stock	140	0	0	..	500
Cash Balance, 1st January, 1860	710	11	4	..	150
			£4103	1	4		£4103
							1
							4
Journal and Proceedings	
Salaries	
Rent, Wages, Lights, &c.	
Library and Map Rooms	
Office Expenses	
Royal Premiums	
Premium for Instruments	
Investments	
Sundries for Balance	
							£4103
							1
							4

NOTTON SHAW.

SUMMARY OF AUDITED ACCOUNTS

FROM 14TH JULY, 1830, TO THE 31ST DECEMBER, 1860.

Receipts.

Payments.

	£.	s.	d.		£.	s.	d.
Entrance Fees	6,592	0	0	Rent, Fixtures, and Fittings	11,310	7	9
Life Compositions	11,723	0	0	Office Expenses	5,276	0	11
Annual Subscriptions	20,546	3	0	Salaries—Secretary, Librarian, Curator, and Clerks	11,431	15	0
Grants in Aid and Greenwich Request	9,943	5	0	Cost of Geographical Publications	13,193	15	6
Royal Premiums	1,575	0	0	Purchase of Books, Maps, and Instruments	2,757	1	5
Sales of Geographical Publications	3,247	9	2	Grants in Aid of Expeditions	7,786	8	0
Dividends and other Receipts	4,844	1	1	Medals and other Premiums	1,716	2	0
Sales of Stock	2,963	5	2	Life Compositions invested	6,974	7	6
				Subscriptions returned	267	14	0
					£60,653	12	1
				Cash Balances	710	11	4
					£61,364	3	5

London, 4th May, 1861.

E. OSBORNE SMITH, F.R.G.S.

Library Regulations.

I. The Library will be open every day in the week (Sundays excepted) from *Eleven* in the morning to *Five* in the afternoon,* except on New-Year's Day, Good Friday to Easter Monday inclusive, and Christmas week, and it will be closed one month in the year, in order to be thoroughly cleaned, viz. from the first to the last day of September.

II. Every Fellow of the Society is entitled (*subject to the Rules*) to borrow as many as four volumes at one time.

Exceptions :—

1. Dictionaries, Encyclopædias, and other works of reference and cost, Minute Books, Manuscripts, Atlases, Books and Illustrations in loose sheets, Drawings, Prints, and unbound Numbers of Periodical Works, *unless with the special written order of the President.*
2. Maps or Charts, *unless by special sanction of the President and Council.*
3. New Works before the expiration of a month after reception.

III. The title of every Book, Pamphlet, Map, or Work of any kind lent, shall first be entered in the Library-register, with the borrower's signature, or accompanied by a separate note in his hand.

IV. No work of any kind can be retained longer than one month; but at the expiration of that period, or sooner, the same must be returned free of expense, and may then, upon *re-entry*, be again borrowed, provided that no application shall have been made in the mean time by any other Fellow.

V. In all cases a list of the Books, &c., or other property of the Society, in the possession of any Fellow, shall be sent in to the Secretary *on or before the 1st of July in each year.*

VI. In every case of loss or damage to any volume, or other property of the Society, the borrower shall make good the same.

VII. No stranger can be admitted to the Library except by the introduction of a Fellow, whose name, together with that of the Visitor, shall be inserted in a book kept for that purpose.

VIII. Fellows transgressing any of the above Regulations will be reported by the Secretary to the Council, who will take such steps as the case may require.

By Order of the Council,

NORTON SHAW.

* On Saturday the Library is closed at 3 P.M.

ROYAL GEOGRAPHICAL SOCIETY.

Patron.
THE QUEEN.

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(ELECTED 27th MAY, 1861.)

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F E L L O W S.

(TO MARCH 1ST, 1862.)

N.B.—Those having * preceding their names have compounded for life.

Year of Election.	
1860	À Beckett, Arthur M., Esq., F.R.C.S.E., 15, <i>Uxbridge-road, Surbiton, S.W.</i>
1851	Abinger, W. F. Scarlett, Lord. 70, <i>Jermyn-street, S.W.</i>
1835	Acland, Prof. Henry Westworth, M.D. <i>Oxford.</i>
1861	Acland, J. Barton Arundel, Esq. <i>Mount Peel, Canterbury, New Zealand.</i>
1853	Acland, Sir Peregrine Palmer F. P., Bart. <i>Fairfield, Somerset.</i>
1830	*Acland, Sir Thomas Dyke, Bart., F.R.S. <i>Waterloo-hotel, Jermyn-street, S.W.; and Killerton, Exeter, Devon.</i>
1861	Addington, Right Hon. H. U. 78, <i>Eaton-place, S.W.</i>
1840	Agnew, Sir Andrew, Bart., M.P. 33, <i>Grosvenor-street, W.; and Lochans Castle, Wigtownshire.</i>
1861	Aikin, James, Esq. <i>Liverpool.</i>
1859	10 Ainalle, Col. H. Francis. <i>Junior United Service Club, S.W.; and Burlington Chambers, 180, Piccadilly, W.</i>
1830	*Ainsworth, W. Francis, Esq., F.S.A. <i>Ravencourt-villa, New-rd., Hammersmith, W.</i>
1857	Alvey, John Moore, Esq. <i>Conservative Club, W.</i>
1859	Airlie, David Graham, Earl of. <i>Holly-lodge, Kensington, W.</i>
1860	Aitchison, David, Esq. 180, <i>Piccadilly, W.</i>
1830	*Albemarle, George Thomas, Earl of. 11, <i>Grosvenor-square, W.; Quiddenham-hall, Larkingford, Norfolk; and Elvedon-hall, Suffolk.</i>
1834	*Alcock, Thomas, Esq., M.P. <i>Kingswood-warren, near Epsom, Surrey.</i>
1838	*Aldam, William, Esq. <i>Frickley-hall, near Doncaster.</i>
1857	Aldrich, Commander Robert D., R.N. <i>Windmill-road, Croydon, Surrey, S.</i>
1830	Alexander, Colonel Sir Jas. Ed., K.L.S., F.R.S.E., etc., 14th Regt. <i>United Service Club, S.W.; and Fermoy, Ireland.</i>
1855	10 Alger, John, Esq. 16, <i>Oakley-square, N.W.</i>
1857	Allan, George W., Esq. <i>Toronto, Canada.</i>
1858	Allan, Jas., Esq. 122, <i>Lundenhall-street, E.C.</i>
1835	*Allen, Capt. Wm., R.N., F.R.S. <i>Athenæum Club, S.W.; and 7, Russell-st., Bath.</i>
1859	Alsager, Thos. H., Esq. <i>Reform Club, S.W.; and Chislehurst, Kent.</i>
1859	Ansell, Henry, Esq. 3, <i>Norfolk-crescent, Hyde-park, W.</i>
1854	Ancona, J. S., Esq. 8, <i>John-street, Adelpbi, W.C.</i>
1860	Anderson, John Edmund, Esq. 4, <i>Stanhope-street, Hyde-park-gardens, W.</i>
1861	*Anderson, John, Esq. 64, <i>Mark-lane, E.C.; and Peterhead, Aberdeenshire.</i>
1861	*Anderson, Col. W., C.B. 19, <i>Gloucester-square, Hyde-park, W.</i>
1858	30 *Andrew, William P., Esq. <i>Oaklands, Sydenham, Kent, S.E.</i>

Year of
Election.

- 1861 Annenley, Col. the Hon. Hugh, M.P. 25, *Norfolk-street, Park-lane, W.*
- 1860 *Anson, Sir John William Hamilton, Bart. 55, *Notland-place, S.W.*
- 1853 Ansted, Prof. D. T., M.A., F.R.S., etc. *Athenæum Club, S.W.; and Bonair St. Martin, Guernsey.*
- 1857 Anstruther, M.-Gen. Philip, C.B. *Madras Artillery, 1, Chapel-st., Grosvenor-place, S.W.*
- 1830 *Antrobus, Sir Edmund, Bart. 146, *Piccadilly, W.; Lower Cheam, Epsom, Surrey; and Amesbury, Wilts.*
- 1858 Arbuthnot, George, Esq. 23, *Hyde-park-gardens, W.*
- 1860 Arceadekne, Andrew, Esq. 35, *Albemarle-street, W.*
- 1861 Archer, Graves Thos., Esq. 5, *Bolton-rose, W.*
- 1860 Archer, W. H. D., Esq., of Tasmania. 20, *King-street, Portman-square, W.*
- 1855 40 *Arden, Richard Edward, Esq. *Sunbury-park, Middlesex, S.W.*
- 1858 *Armistead, Rev. Chas. John, Chaplain, M.A., F.S.A. *Long's Hotel, New Bond-street, W.; and Roundhay, near Leeds.*
- 1857 Armstrong, Alexander, Esq., M.D., R.N., Deputy Inspector-General Royal Naval Hospital, Malta. *Miskle Temple, E.C.; and Junior United Service Club, S.W.*
- 1830 *Arrowsmith, John, Esq., F.R.A.S. 35, *Hereford-square, South Kensington, S.W.*
- 1859 Ashburton, William Bingham, Lord, F.R.S. *Bath House, Piccadilly, W.; and The Grange, Alresford, Hants.*
- 1856 Ashwell, the Rev. Arthur Rawson, M.A., Principal of Oxf. Dioc. Training College. *The College, Cutham, Oxon.*
- 1853 *Ashwell, James, Esq., M.A., F.G.S.
- 1851 Astley, Francis D. P., Esq., M.R.I. 67, *Eaton-square, S.W.*
- 1830 *Atkins, John Pelly, Esq., F.S.A. *Halsted-house, near Sevenoaks.*
- 1860 Attwell, Professor Henry. *Barnes, S.W.*
- 1839 50 Attwood, Matthias Wolverley, Esq. 27, *Gracechurch-street, E.C.*
- 1861 Auble, William, Esq. 3, *Furnival's-inn, Holborn, E.C.*
- 1859 Austen, Capt. Henry H. Godwin, 24th Foot, Trig. Survey, Punjab. *Junior United Service Club, S.W.; and Chilworth Manor, Guildford, Surrey.*
- 1854 Ayrton, Acton S., Esq., M.P. 24, *Grafton-street, Bond-street, W.*
- 1845 *Ayrton, Frederick, Esq. *Egypt.*
- 1836 *Back, Rr.-Adm. Sir Geo., D.C.L., F.R.S. 109, *Gloucester-place, Portman-sq., W.*
- 1859 Baikie, Robert, Esq., M.D., late Madras Army. *Oriental Club, W.; and Kirkcaldy, Orkneys, N.B.*
- 1855 Baikie, Wm. Balfour, Esq., M.D., R.N. *Niger Expedition. Brunswick-cottage, Forton-road, Gosport.*
- 1859 Bailey, L. C., Esq., R.N. *Topographical Department, New-street, Spring-gardens, S.W.*
- 1857 Baillie, Capt. John, 26th Bengal Native Infantry. *India.*
- 1861 60 Baillie, William Henry, Esq. 14, *Belgrave-square, S.W.*
- 1857 Baines, Thomas, Esq. *Cape of Good Hope; and 14, Union-street, Lynn Regis.*

Year of Election.	
1861	Baker, John, Esq.
1855	Baker, Capt. Wm. T., 85th Regt. <i>Graham Town, South Africa; and 31, Grosvenor-place, Bath.</i>
1861	Baldwin, William Charles, Esq. <i>Layland Vicarage, Preston.</i>
1861	Balfour, David, Esq. <i>Balfour Castle, Kirkwall, N.B.</i>
1847	Balfour, Lieut.-Colonel George, M.A. <i>East Indies.</i>
1833	Balfour, John C. B., Esq. <i>New South Wales; and Colinton, Queensland.</i>
1860	Ball, John, Esq. 18, <i>Park-street, Westminster, S.W.</i>
1852	Bancroft, Capt. W. C., 15th Regt. <i>Aide de Camp and Military Sec., King's House, Jamaica; M^r Greer and Co., Charles-street, S.W.</i>
1862	70 Banks, George F., Esq., Surgeon, R.N. <i>Llandudno, North Wales.</i>
1838	Bannerman, Sir Alexander, Bart. <i>Crinismogote, Aberdeenshire.</i>
1840	*Barclay, Arthur Kett, Esq., F.R.S. <i>Park-street, Southwark, S.E.; and Bury-hill, Dorking, Surrey.</i>
1852	Barclay, David, Esq. <i>Eastwick-park, Surrey.</i>
1858	Baring, The Hon. Francis. 16, <i>St. James's-square, S.W.</i>
1838	Baring, Rt. Hon. Sir Francis T., Bart., M.P., F.R.S. <i>Strutton-ph., Andover, Hants.</i>
1835	*Baring, John, Esq. <i>Oakwood, Chichester.</i>
1844	*Baring, Thomas, Esq., M.P. 41, <i>Upper Grosvenor-street, W.</i>
1853	Barnett, Capt. Edward, R.N. 14, <i>Woburn-square, W.C.</i>
1858	Barratt, James, Esq. <i>Lynne Hall, near Harrington, Cheshire.</i>
1859	80 Barrington, the Hon. George.
1833	Barrow, John, Esq., F.R.S., F.S.A. 17, <i>Hammer-terrace, Regent's-park, N.W.</i>
1856	Barth, Heinrich, Esq., PHIL. DR. <i>Berlin.</i>
1857	Bartholomew, John, Junr., Esq. 4, <i>North Bridge, Edinburgh.</i>
1861	Bartlett, Herbert Lewis, Esq. <i>Union Club, S.W.</i>
1862	Barton, Dr. Alfred. 51, <i>Craven-street, Strand, W.C.</i>
1837	*Bateman, James, Esq., F.R.S., L.S. <i>Kingsley-hall, Staffordshire.</i>
1859	Bateman, John F., Esq., C.E. 16, <i>Great George-street, Westminster, S.W.</i>
1852	*Bates, Josh., Esq. 21, <i>Arlington-st., Piccadilly, S.W.; and East Sheen, Surrey, S.W.</i>
1858	Baxendale, Joseph H., Esq. 14, <i>Chester-terrace, Regent's-park, N.W.; and Scott's-bridge, near Rickmansworth, Herts.</i>
1862	90 Baynes, Lieut.-Col. R. Stuart. <i>Army and Navy Club, S.W.</i>
1832	Beardmore, Nathaniel, Esq., C.E. 30, <i>Great George-street, Westminster, S.W.</i>
1857	Beardmore, Septimus, Esq., C.E. 27, <i>Abison-street, Hyde-park, W.</i>
1858	Beaucherk, Aubrey de Vere, Esq. <i>Ardglass, Co. Belfast.</i>
1854	Beaufort, William Morris, Esq., <i>Bengal Civil Service. Bengal.</i>
1858	Benamont, John Aug., Esq. <i>Melrose-hall, Putney-heath, S.W.; and 50, Regent-street, W.</i>
1851	*Benamont, Wentworth B., Esq., M.P. 144, <i>Piccadilly, W.; Bynell-hall, Newcastle-upon-Tyne; and Bretton-park, Wakefield.</i>
1830	Becher, Capt. Alex. B., R.N. <i>Admiralty, S.W.; and 13, Dorset-place, Dorset-sq., N.W.</i>

Year of Election.

- 1861 Beckett, James F., Esq., R.N. 15 *Buckland-crescent, Belvoir-park, N.W.*
- 1838 *Beckford, Francis, Esq. *Travellers' Club, S.W.*
- 1854 100 Bedford, Commander Edward James, R.N. *Oban, N.B.*
- 1859 Bedford, Capt. G. Augustus, R.N. 31, *Royal-crescent, Notting-hill, W.*
- 1855 Bedingfield, Commander Norman B., R.N. 44, *Charing Cross, S.W.*
- 1861 *Begbie, James, Esq. 27, *Mark-lane, E.C.*
- 1860 Begbie, Thomas Stirling, Esq. 4, *Mansion-house-place, E.C.*
- 1846 Beke, Charles Tilstone, Esq., PH. DR., F.R.S., &c. *Bekebourne House, Kent; and Cambridge Heath, Hackney, N.E.*
- 1853 Belcher, Rev. Brymer. *St. Gabriel's, Pimlico, S.W.*
- 1850 *Belcher, Rear-Adm. Sir Edward, C.B., F.R.S. 7, *Norland-square, W.; and Union Club, S.W.*
- 1858 Beldam, Edward, Esq. 1, *Stone-buildings, Lincoln's-inn, W.C.; and Royaton, Herts.*
- 1848 Beldam, Joseph, Esq. *Royaton, Herts.*
- 1858 110 *Bell, C. Davidson, Esq., Surveyor-General, Cape of Good Hope. *Cape Town.*
- 1850 Bell, James, Esq. 1, *Devonshire-place, Portland-place, W.*
- 1830 *Bell, James Christian C., Esq. 42, *Westbourne-terrace, W.; and 15, Angel-court, Throgmorton-street, E.C.*
- 1830 *Bennett, John Joseph, Esq., F.R.S. *British Museum, W.C.*
- 1857 Bennett, J. Biddon, Esq., M.D. 15, *Finbury-square, E.C.*
- 1856 *Benson, Robert, Esq. 16, *Crown-hill-gardens, Baywater, W.*
- 1856 *Benson, William, Esq., Barrister-at-Law. *Oxford and Cambridge Club, Pall Mall, S.W.*
- 1830 Bentham, George, Esq., Pres. L.S. 25, *Wilton-place, S.W.*
- 1833 Bentley, Richard, Esq. *New Burlington-street, W.*
- 1839 Berens, H. Hulse, Esq. *Hudson Bay House, Fenchurch-street, E.C.*
- 1861 120 Berkley, George, C.B. 24, *Great George-street, S.W.*
- 1858 Bernays, Adolphus, Esq., PH. DR., Professor of German. *King's College, W.C.; and 29, Inverness-road, W.*
- 1860 Bernays, Rev. Leopold John. *Great Stumora.*
- 1856 Berry, Josiah, Esq. 16, *Regent-square, W.C.*
- 1842 *Bethune, R.-Admiral C. R. Drinkwater, C.B. 56, *Westbourne-ter., Hyde-park, W.*
- 1836 Betts, John, Esq. 115, *Strand, W.C.*
- 1860 Bidder, Geo. Parker, Esq., President Inst. Civ. Eng. 24, *Great George-st., S.W.; and Mitham, Surrey.*
- 1845 *Biddulph, Robert, Esq. 43, *Charing-cross, S.W.; 31, Eaton-place, S.W.; and Ledbury, Herefordshire.*
- 1839 Digge, Frederick W., Esq. *Union Club, S.W.*
- 1850 Bigsby, John J., Esq., M.D. 89, *Gloucester-place, Portman-square, W.*
- 1858 130 Birch, Augustus F., Esq., M.A. Assistant Master, Eton College.
- 1860 Birch, H. W., Esq. 46, *Wellbeck-street, Cavendish-square, W.*
- 1858 Birch, John William, Esq. 9^a, *New Broad-street, E.C.; and 27, Park-street, Grosvenor-square, W.*

Year of Election.	
1859	Birch, Capt. Thomas, R.N. <i>United Service Club, S.W.</i>
1847	*Bird, James, Esq., M.D. 27, <i>Hyde-park-square, W.</i>
1858	Bishop, George, Esq., F.R.A.S. <i>Union Club, S.W.; and Cambridge Lodge, Twickenham, S.W.</i>
1861	Bishop, James, Esq. 16, <i>Park-square, Regent's-park, N.W.</i>
1836	*Blasgow, William H., Esq., M.A., F.R.S., F.Z.S. <i>Becklands, near Uckfield, Sussex.</i>
1860	*Black, Francis, Esq. 6, <i>North-bridge, Edinburgh.</i>
1858	Blackett, Henry, Esq. 13, <i>Great Marlborough-street, W.</i>
1849	140 Blackie, W. Graham, Esq., PH. DR. 36, <i>Frederick-street, Glasgow.</i>
1857	Blackstone, Alan C., Esq. <i>Board of Works, Whitehall-place, S.W.</i>
1851	Blackwell, Thomas Evans, Esq., C.E. <i>Grand Trunk Railway, Montreal, Canada.</i>
1854	Blaine, D. Robertson, Esq., Barrister-at-Law. 3, <i>Paper-buildings, Temple, E.C.; and 8, Southwick-place, Hyde-park-square, W.</i>
1857	*Blake, Wollaston, Esq. 8, <i>Devonshire-place, W.</i>
1859	Blakeley, Capt. Alexr., R.A.
1857	Blakiston, Captain Thomas, R.A. 11, <i>Gower-street, W.C.</i>
1830	*Blanshard, Henry, Esq., F.R.A.S. 53, <i>Chancery-lane, W.C.</i>
1861	*Blanshard, Henry, Esq. <i>Upper Bedford-place, W.C.</i>
1857	Blanshard, Richard, Esq. <i>Fairfield, Lymington, Hants.</i>
1854	150 Blencowe, W. Robert, Esq. <i>The Hook, Leves.</i>
1861	Blenkin, William B., Esq. <i>Aldrestone, near Chertsey, Surrey.</i>
1839	*Blewitt, Octavian, Esq. 4, <i>Adelphi-terrace, Strand, W.C.</i>
1852	Block, Samuel Richard, Esq. <i>Green-hill, near Whetstone, Herts.</i>
1861	Bloxsome, Oswald, Esq. <i>Aldrestone House, Cheshill, Northumberland.</i>
1837	*Blunt, Jos., Esq. 13, <i>Austin Friars, E.C.; and Leyden House, Mortlake, Surrey.</i>
1858	Bohn, Henry G., Esq. <i>York-st., Covent-garden, W.C.; and North End House, Twickenham, S.W.</i>
1850	Bollaert, Wm., Esq., Corr. Mem. University of Chile. 21 ^a , <i>Hanover-sq., W.</i>
1861	Bompas, George Cox, Esq. 15, <i>Stanley-gardens, Kensington-park, W.</i>
1861	Boone, Charles, Esq. <i>Adelaide, Australia.</i>
1858	160 Bonnor, George, Esq. 49, <i>Pall-mall, S.W.; and 2, Baymeader-terr., Kensington-square, W.</i>
1859	Borough, Sir Edward, Bart. 32, <i>Broad-street, Grosvenor-square, W.; and 4, Nassau-street, Dublin.</i>
1845	*Borrer, Dawson, Esq. <i>Altmont Ballon, Co. Carlow, Ireland.</i>
1856	Botcherby, Blackett, Esq., M.A. 48, <i>Brompton-row, S.W.</i>
1839	*Botfield, Beriah, Esq., M.P., F.R.S., F.R.A., F.R.S.N.A. 5, <i>Grosvenor-square, W.; and Norton-hall, Deventry, Northamptonshire.</i>
1858	*Botterill, John, Esq. <i>Flower Bank, Burley-road, Leeds.</i>
1860	Boustead, John, Esq. 34, <i>Craven-street, Strand, W.C.</i>
1835	Bovet, Charles, Esq. 6, <i>Belvue Villas, Seven Sisters'-road, Holloway, N.</i>
1861	Bowen, Charles Christopher, Esq. <i>Christchurch, Canterbury, New Zealand.</i>
1854	*Bowen, Sir George Ferguson, K.C.M.G., M.A. <i>Governor of Queensland, Australia.</i>

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- 1836 170 Bower, George, Esq. 6, *Totenhouse-yard, E.C.*
- 1833 Bowles, Admiral William, C.B. 8, *Hill-street, Berkeley-square, W.*
- 1856 Bowman, John, Esq. 9, *King William-street, E.C.*
- 1845 Boyd, Edward Lennox, Esq., F.R.S. 8, *Waterloo-place, Pall-mall, S.W.*
- 1856 Boyse, G. Hamilton-Russell, Viscount. 22, *Belgrave-square, S.W.*; *Bronce-
petit Castle, Durham*; and *Burcarton Hall, Ludlow, Salop.*
- 1851 Bracebridge, Charles Holte, Esq. *Atherstone, Warwick.*
- 1858 Braddell, Thomas, Esq. *Magistrate at Penang.*
- 1857 Brady, Cheyne, Esq., Barrister-at-Law. 104, *Grafton-street, Dublin.*
- 1857 Bramston, Thos. W., Esq., M.P. *Carlton Club, S.W.*; and *Shreens, Chelmsford,
Essex.*
- 1859 *Brand, James, Esq. 109, *Fenchurch-street, E.C.*
- 1860 180 Brausey, T., Esq. 4, *Great George-street, S.W.*; and 56, *Loxnes-square, S.W.*
- 1857 Brasted, Rev. J. B. 27, *Hampshire-terrace, Southsea, Hants.*
- 1859 Braybrooke, Philip Watson. *Assistant Colonial Secretary, Ceylon.*
- 1852 Broadalbane, John, Marquis of, K.T., F.R.S. 21, *Park-lane, W.*; and *Taymouth-
castle, Aberfeldie.*
- 1861 *Brenchley, Julius, Esq. *Oxford and Cambridge Club, S.W.*; and *Milgate, near
Maidstone, Kent.*
- 1845 *Brent, George Smith, Esq. 1, *Bedford-street, Strand, W.C.*
- 1846 Brereton, Rev. C. D., M.A. *Little Massingham, Rougham, Norfolk.*
- 1833 *Brereton, Rev. John, LL.D., F.R.S. *Bedford.*
- 1834 *Breton, William Henry, Esq., Lieut. R.N., M.R.I. 15, *Camden-place, Bath.*
- 1857 Brett, John Watkins, Esq. 2, *Hanover-square, W.*
- 1858 190 Bridges, Nathaniel, Esq. 16, *Southwick-crescent, Hyde-park, W.*
- 1852 *Brierly, Oswald W., Esq. 8, *Lidlington-pl., Harrington-sq., Hampstead-rd., N.W.*
- 1861 *Bright, Sir Charles T. 1, *Victoria-street, Westminster, W.*; and 12, *Upper
Hyde-park-gardens, W.*
- 1860 Bright, John, Esq., M.D. 12, *Cambridge-square, Hyde-park, W.*
- 1857 Brine, Lieut. Bruce, R.E. *Malta*; and *Claremont, Sidmouth.*
- 1854 Brine, Capt. Frederic, R.N. *Army and Navy Club, S.W.*; *Claremont,
Sidmouth*; and *Hong Kong, China.*
- 1856 Brine, Lt. Lindsay, R.N. *Army and Navy Club, S.W.*; and *Claremont, Sidmouth.*
- 1861 Bristowe, Henry Fox, Esq. 53, *Rutland-gate, S.W.*
- 1861 Broadwater, Robert, Esq. 3, *Diliter-square, Fenchurch-street, E.C.*
- 1833 *Brodie, Sir Benjamin C., Bart., D.C.L., President R.S., &c., *Serjeant Surgeon
to the Queen.* 22, *Scille-row, W.*; and *Broome-park, Surrey.*
- 1861 200 Brodie, Walter, Esq. 15, *Delamere Terrace, Hyde-park, W.*; and *The Gore,
Eastbourne, Sussex.*
- 1861 Brodie, William, Esq. *Eastbourne, Sussex.*
- 1856 Brook, Captain William, 35th Regt. 1, *Clifton-terrace, Ramsgate.*
- 1838 Brooks, Sir James, K.C.B., D.C.L. *Athenaeum Club, S.W.*; and *Sarawak, Borneo.*
- 1862 Brookes, Thomas, Esq. *Mattock-lane, Ealing, W.*
- 1856 *Brooking, George Thomas, Esq. 25, *Stanes-gardens, Hyde-park, W.*

Year of
Election.

- 1856 *Brooking, Marquise Hart, Esq. 5, *Norfolk-crescent, Hyde-park, W.*
- 1843 *Brooking, Thomas Holdsworth, Esq. 14, *New Broad-street, City, E.C.; and 5, Norfolk-crescent, Hyde-park, W.*
- 1850 Broughton, John, Lord, G.C.B., M.A., F.R.S. 42, *Berkeley-square, W.; and Eristotele-park, Westbury, Wilts.*
- 1859 Broughton, L. P. Delves, Esq. 2, *Tanfield-court, Temple, E.C.*
- 1856 110 *Brown, Daniel, Esq. *The Elms, Larkhall-rise, Clapham, S.*
- 1860 Brown, James, Esq., M.P. *Rossington, Yorkshire.*
- 1861 *Brown, John Allen, Esq. 3, *Newcastle-place, Clerkenwell, E.C.; and Scaleby Lodge, Camden-road, N.*
- 1856 *Brown, Samuel, Esq. 11, *Lombard-st., E.C.; and The Elms, Larkhall-rise, Clapham, S.*
- 1858 *Brown, Thomas, Esq. 8, *Hyde-park-place West, W.*
- 1859 Brown, William, Esq. *Loaf's-road, Clapham-park, S.*
- 1858 Browne, John H., Esq. *Port Gawler, S. Australia.*
- 1858 Browne, William J., Esq. *Port Gawler, S. Australia.*
- 1852 Browning, Henry, Esq. 72, *Grosvenor-street, W.; and Ampton-hall, Bury St. Edmunds.*
- 1856 *Browning, Thomas, Esq. 6, *Whitehall, S. W.*
- 1859 120 Bruce, Henry Austin, Esq., M.P. *Duffryn, Aberdare, Glamorganshire.*
- 1856 Bryant, Walter, Esq., F.R.C.S. 7, *Bathurst-street, Hyde-park-gardens, W.*
- 1844 Bryden, William, Esq. 4, *New Palace-yard, Westminster, S. W.*
- 1843 *Buchan, John Hitchcock, Esq. *The Grove, Hamwell, W.*
- 1859 Buckland, Edward C., Esq. 11, *Lansdowne-road, Notting-hill, W.*
- 1830 *Bullock, Rear-Admiral Frederick. *Woolwich, S.E.*
- 1860 *Bunbury, Sir Charles James Fox, Bart.; F.R.S. *Barton-hall, Bury St. Edmund's.*
- 1839 Bunbury, E. H., Esq., M.A. 15, *Jernyn-street, S. W.*
- 1860 Bunyon, C. J., Esq. 4, *Queen's-terrace, Queen's-gate, Kensington-gore, W.*
- 1861 Bures, William, Esq. *Fethard, Co. Tipperary.*
- 1859 130 Burmester, Edward, Esq. *St. Helen's-place, E.C.; and Springcell, Clapham-common, S.*
- 1830 *Burney, Ven. Archd. Charles Parr, D.D., F.R.S., F.S.A. *Rectory-house, Bishop's Wickham, Essex.*
- 1861 *Burr, Higford, Esq. 23, *Eaton-place, S. W.; and Ahlmannston-court, Berkshire.*
- 1857 Burstall, Commander E., R.N. 6, *Paré-villas, Lower Norwood, S.*
- 1830 *Burton, Alfred, Esq. 36, *Marine, St. Leonard's.*
- 1833 *Burton, Decimus, Esq., F.R.S. 6, *Spring-gardens, S. W.; and St. Leonard's-cottage, Hastings.*
- 1859 *Burton, Capt. Richd. Fras., 18th Regt. Bombay N.I., H.B.M. Consul, Fernando Po. 14, *St. James's-square, S. W.*
- 1847 Barton, S. S. 59, *Montpelier-road, Brighton.*
- 1858 Bury, William Coutts, Viscount, M.P. 48, *Rutland-gate, S. W.*
- 1861 Bush, Rev. Robert Wheeler, M.A. 1 *Milner-square, Islington, N.*
- 1861 140 Butler, Charles, Esq. 13, *Sussex-square, W.*

Year of
Election.

- 1859 Butler, Edward, Esq. *Landscane-road, Hyde-park, W.*
- 1860 *Butler, Rev. Thomas. *Rector of Lough, Nottinghamshire.*
- 1862 *Buxton, Chas., Esq., M.P. 7, *Grosvenor-crescent, S. W.; and Fae Warren, Surrey.*
- 1858 *Buxton, Sir Thomas Fowell, Bart. *Brick-lane, N.E.*
- 1830 *Cabbell, B. B., Esq., M.A., F.R.S., F.S.A. 1, *Brick-court, Temple, E.C.; 52, Portland-place, W.; and Abbeick, Sussex.*
- 1857 *Caldwell, Capt. Henry, R.N. *H.M.S. 'Mersey,' Portsmouth; and 3, Audley-sq., W.*
- 1855 *Calthorpe, the Hon. F. H. Gough, M.P. 33, *Grosvenor-square, W.*
- 1859 Calvert, Edmund, Esq. *British Embassy, Constantinople.*
- 1854 Calvert, Frederic, Esq., Q.C. 9, *St. James's-place, S. W.; and 8, New-square, Lincoln's-inn, W.C.*
- 1830 150 *Camden, George Charles, Marquis, E.C., D.C.L., M.A. *Wilderness-park, Sevenoaks, Kent; and Bayham-abbey, Sussex.*
- 1858 Cameron, Capt. Charles D.
- 1861 Cameron, Donald, Esq. *Aschnacarry, Invernesshire; and 3, Little Ryder-street, S. W.*
- 1858 Cameron, Major-General Duncan Alexander, R.E., C.D., Vice-Pres. Council of Military Education. *Edinburgh.*
- 1861 Campbell, Capt. Frederick, R.N. 12, *Counaught-place, Hyde-park, W.*
- 1844 *Campbell, James, Esq. *Grove House, Hendon, Middlesex; and 8, Park-street, Grosvenor-square, W.*
- 1857 Campbell, James, Esq., Surg., R.N. *Bangkok, Siam; and Luss, Dunbartonsh., N.B.*
- 1834 *Campbell, James, Esq., jun. *Hampton Court-green, S. W.*
- 1861 Campbell, James, Esq. *Regent-street, W.; and Thornton Steward, Yorkshire.*
- 1857 Camps, William, Esq., M.D. 40, *Park-street, Grosvenor-square, W.*
- 1857 150 Cannon, Lieut.-General P. 10, *Kensington-gardens-terrace, Hyde-park, W.*
- 1853 *Cardwell, Right Hon. Edward, M.P. 74, *Eaton-square, S. W.*
- 1861 Carter, Captain Hugh Bonham, Coldstream Guards. *Guards' Club, S. W.; and 6, Whitehall, S. W.*
- 1860 Cartwright, Henry, Esq., F.S.A. *Wyndham Club, S. W.; and 13, Gloucester-square, Hyde-park, W.*
- 1857 Cartwright, Col. Henry, Grenadier Guards, M.P. 46, *Park-st., Grosvenor-sq., W.*
- 1830 *Cartwright, Samuel, Esq., F.R.S., F.S.A. 32, *Old Burlington-street, W.; and Nisell's-house, Tonbridge.*
- 1860 Carver, the Rev. Alfred J., Master of Dulwich College. *Dulwich, S.*
- 1858 Casella, Louis P., Esq. 23, *Hatton-garden, E.C.; and South-grove, Highgate, N.*
- 1860 Caulfield, Colonel James Molynaux. 23, *Bruton-street, Berkeley-square, W.*
- 1860 Cave, Amos, Esq. 14, *Kennington-park, S.; and Rathbone-pl., Oxford-st., W.*
- 1857 170 Cave, Capt. Laurence Trent. 23, *Lowndes-street, Belgrave-square, S. W.*
- 1858 Cave, Stephen, Esq., M.P. 35, *Wilton-place, S. W.*
- 1857 Chalmers, Alexander Thomson, Esq., M.D.
- 1861 Chambers, George Frederic, Esq. 2, *Palace-gardens-terrace, Campden Hill, W. and Enslowe, Sussex.*

Year of
Election.

- 1858 Champion, John Francis, Esq. 9, *Canterbury-cillas, Briston, S.*
- 1855 Chapman, John, Esq. 124, *Pall Mall, S.W.*; and 2, *Leadenhall-street, E.C.*
- 1834 *Chapman, Capt. John James, B.A., F.R.S. 33, *Adelaide-square, Bedford.*
- 1861 Charnock, Richard Stephens, Esq. 8, *Gray's-inn-square, W.C.*
- 1861 Cheetham, John Frederick, Esq. *Eastwood, Staleybridge.*
- 1855 Cheshire, Edward, Esq. *Conservative Club, S.W.*
- 1839 220* Chesney, Major-General Francis Rawdon, B.A., D.C.L., F.R.S. *Athenaeum Club, S.W.*; and *Ballyardle, Down, Ireland.*
- 1858 Chetwode, Augustus L., Esq. 2, *Little Ryder-street, S.W.*; and *Chilton House Thame, Oxfordshire.*
- 1858 Childers, Hugh C. E., Esq., M.P. 17, *Princes-gardens, W.*; and *Australia.*
- 1856 Childers, John Walbanke, Esq. *Cantley Hall, near Doncaster.*
- 1837 *Chimmo, Lieut. William, R.N. *Skys Island; and Admiralty, S.W.*
- 1861 Christian, Capt. Henry, R.N. *Commr. of the Royal Yacht, Portsmouth.*
- 1850 Christmas, Rev. H., M.A., D.C.L., F.R.S., F.S.A. 3, *Dunes-inn, Strand, W.C.*
- 1854 Christy, Henry, Esq. 103, *Victoria-street, S.W.*; and *Woodbines, near Kingston, Surrey, S.W.*
- 1854 *Church, J. W., Esq., B.A. *United University Club, S.W.*; and *Woodside, Hatfield.*
- 1830 Church, W. H., Esq.
- 1849 120* Churchill, Lord Alfred Spencer, M.P. 16, *Rutland-gate, S.W.*
- 1856 Churchill, Charles, Esq. 29, *Sunset-square, Hyde-park, W.*
- 1833 Clarendon, George William, Earl of, K.G., G.C.B. 1, *Gravenor-crescent, S.W.*; *The Grove, Watford, Herts*; and *Hindon, Wilts.*
- 1852 Clark, Daniel, Esq. 49, *Milner-square, Islington, N.*
- 1840 *Clark, Sir James, Bart., M.D., F.R.S. 22 b, *Brook-street, W.*
- 1862 Clark, Latimer, Esq. 1, *Victoria-street, Westminster, S.W.*; and *Cairo.*
- 1851 Clark, Rev. Samuel, M.A. *Principal of the Training College, Battersea, S.W.*
- 1850 Clarke, Capt. A., R.E. *Army and Navy Club, S.W.*
- 1860 Clarke, Rev. Joseph W., B.D., Chaplain R.N. *H.M.S. 'Hawke.'*
- 1859 Clarke, Samuel, Esq., C.E. 27, *Upper Brook-street, Ipswich.*
- 1855 300* Clarke, Rev. W. B., M.A. *St. Leonard's, Sydney, New South Wales.*
- 1859 Clarke, Rev. W. Geo., M.A. *Trinity College, Cambridge.*
- 1842 Clavering, Sir William Aloysius, Bart., M.A. *United University Club, S.W.*; and *Arncliffe-park, near Gateshead.*
- 1860 Clerk, Capt. Claude.
- 1830 *Clerk, Rt. Hon. Sir George, Bart., D.C.L., F.R.S., &c. *Pennicuik-house, Edinburgh.*
- 1858 Clermont, Thomas, Lord. *Ratensdale-park, Newry, Ireland.*
- 1861 Clifford, Sir Charles. *Coldham Hall, Suffolk.*
- 1858 Clifford, Charles Cavendish, Esq., M.P. *House of Lords, S.W.*
- 1856 Clive, Ray, Archer. *Whitfield, Hereford.*
- 1854 Clowes, George, Esq. *Duke-street, Stamford-street, Blackfriars, S.*; and 89, *Westbourne-terrace, W.*
- 1854 310 Clowes, Wm., Esq. 31, *Gloucester-ter., Hyde-park, W.*; and *Banstead, Surrey.*

Year of
Election.

- 1861 Clowes, William Charles Knight, Esq. 89, *Westbourne-terrace*, W.
- 1852 Cobbold, John Chevallier, Esq., M.P. *Athenæum Club*, S.W.; and *Ipswich*, Suffolk.
- 1859 Cochrane, Capt. the Hon. A., R.N., C.B. *Junior United Service Club*, S.W.
- 1859 Cocks, Colonel C. Lygon, Coldstream Guards. *Trevelbyn-Fearn*, near *Liskeard*.
- 1861 *Cocks, Reginald Thistlethwayte, Esq. 43, *Charing-cross*, S.W.; and 22, *Hertford-street*, May-fair, W.
- 1857 Coghlan, Edward, Esq. *Training Institution*, *Gray's-inn-road*, W.C.
- 1861 Coghlan, J., Esq., Engr.-in-Chief to the Government; *Buenos Ayres*.
- 1838 Colchester, Charles, Lord, Rear-Admiral, D.C.L. 34, *Berkeley-square*, W.; and *Kidbrooke*, Sussex.
- 1853 Cole, John Griffith, Esq., M.A., M.B.I. 8, *Charles-street*, *Berkeley-square*, W.
- 1841 320 Colebrooke, Sir Thomas Edward, Bart., M.P., F.R.S. 37, *South-st.*, *Park-lane*, W.
- 1834 Colebrooke, Lt.-General Sir Wm., R.A., M.O., C.B., K.H., F.R.S. *Datchet*, near *Windsor*; and *United Service Club*, S.W.
- 1854 Coleman, Everard Home, Esq., F.R.S. *Registry and Record Office*, *Adelaide-place*, *London Bridge*, E.C.
- 1848 Coles, Charles, jun., Esq. 86, *Great Tower-street*, E.C.
- 1835 *Collett, William Rickford, Esq.
- 1858 Collinson, Henry, Esq. 8, *St. James'-terrace*, *Paddington*, W.
- 1855 Collinson, Captain Richard, R.N., C.B. *Haven-lodge*, *Ealing*, W.; and *United Service Club*, S.W.
- 1861 *Colville, Charles John, Lord. 42, *Easton-place*, S.W.
- 1861 Combe, Thomas, Esq., M.A. *University Press*, *Oxford*.
- 1860 Coughnam, William, Esq., M.P. *Kemp Town*, *Brighton*.
- 1861 330 Constable, Commander Chas. Golding, L.N. 16, *Cunningham-pl.*, *Maida-hill*, W.
- 1843 *Cook, James, Esq. 40, *Mincing-lane*, E.C.; and 47, *Portland-place*, W.
- 1859 Cooke, Major A.C., R.E. *Topographical Department*, 4, *New-street*, *Spring-gardens*, S.W.
- 1860 Cooke, George Wingrove, Esq., Barrister-at-Law. 2, *Brick-court*, *Temple*, E.C.; and 25, *Cheyne-walk*, *Chelsea*, S.W.
- 1856 Cooke, John George, Esq. 47, *Mount-street*, *Berkeley-square*, W.
- 1860 Cooke, Nathaniel, Esq. 5, *Ladbroke-terrace*, *Notting-hill*, W.
- 1852 Cooke, Robt. F., Esq. 50, *Albemarle-st.*, W.; and 38, *Nottingham-pl.*, *New-rd.*, W.
- 1860 Cooke, William Henry, Esq., Barrister-at-Law. 4, *Elm-court*, *Temple*, E.C.
- 1830 Cooley, William Desborough, Esq. 10, *Portman-street*, *Portman-square*, W.
- 1843 *Cooper, Capt. D. S., 1st Royal Regt. *Army and Navy Club*, S.W.
- 1856 340 Cooper, Lt.-Col. Edward, Grenadier Guards. 36, *Hertford-street*, W.
- 1860 Cooper, Capt. Joshua H. 7th *Fusiliers*, *Dépôt*, *Chatham*.
- 1853 Coote, Charles Chidley, Esq. C4, *Army*, S.W.; and *Mount-Coote*, *Limerick*, *Ireland*.
- 1857 *Coote, Captain Robert, R.N. *H.M.S. 'Victory'*, *Portsmouth*.
- 1854 Copley, Sir Joseph William, Bart. *Sprotborough*, *Doncaster*.
- 1860 Cornwell, James, Esq., TIL DR. *Loughborough-park Villa*, *Bristol*, S.
- 1839 *Corrance, Frederick, Esq. *Parkham-hall*, *Wickham Market*, *Suffolk*.

Year of
Election.

- 1856 Costerton, John C., Esq. *Canton.*
- 1853 *Cozway, William Halliday, Esq. *Oxford and Cambridge Club, S.W.*
- 1857 *Cowell, Major J. C., R.N. *Buckingham-palace, S.W.*
- 1861 150 Cowell, John Jermyn, Esq. *Trinity College, Cambridge.*
- 1854 Cowley, Norman, Esq. 4, *Montagu-place, Montagu-square, W.*
- 1853 *Cracraft, Captain Peter, R.N. *H.M.S. 'Niger,' Australia.*
- 1858 Cranbourne, James, Viscount. 20, *Arlington-street, S.W.*
- 1853 Cranford, Captain Frederic A. B., R.N. *Senior United Services Club, S.W.; and H.M.S. 'Archer,' West Coast of Africa.*
- 1857 Cranford, Major-General James R. Cane, Grenadier Guards. *Travellers' Club, S.W.; and Sunning-hill, Chertsey.*
- 1857 Crawford, James, Esq. *Brusa, Turkey.*
- 1848 Crawford, Robert Wigram, Esq., M.P. 71, *Old Broad-street, E.C.*
- 1830 Crawford, John, Esq., F.R.S. *Athenaeum Club, S.W.; and 21, Wilton-st., S.W.*
- 1861 Creswell, Rev. S. P., B.A. *Grammar School, Tonbridge, Kent.*
- 1854 160* Creswell, Captain S. Gurney, R.N. *Lynn, Norfolk.*
- 1859 Creyke, Capt. R. Boynton, R.N. *Hydrographic Office, Admiralty, S.W.*
- 1856 Croker, T. F. Dillon, Esq. 19, *Palham-place, Brompton, S.W.*
- 1860 *Crooke, J. Rodney, Esq. 84, *King William-street, E.C.; and Warwick-house, Warwick-road, Paddington, W.*
- 1860 Croase, the Rev. Thomas, D.C.L. *Hastings.*
- 1862 Crossman, James Hiscutt, Esq. *Upper Sydenham, Kent, S.E.*
- 1852 Crowdy, James, Esq. 17, *Serjeants'-inn, E.C.*
- 1861 Crowley, Jonathan Sparrow, Esq., C.E. *Landseer-hill, Battersea, S.W.*
- 1861 Cruikshank, David, Esq. *Acenue-place, Southampton.*
- 1844 *Cubitt, Right Hon. William, Lord Mayor. *Mansion House, E.C.; Gray's-inn-road, W.C.; and 21, Abchurch-lane, E.C.*
- 1859 170 Cull, Richard, Esq., F.R.S. 13, *Tavistock-street, Bedford-square, W.C.*
- 1857 Cumming, William Fullarton, Esq., M.D. *Athenaeum Club, S.W.; and Athol-crescent, Edinburgh.*
- 1847 *Cunard, Edward, Esq. *New York.*
- 1846 Cunard, Sir Samuel, Bart. *Bush-hill-park, Edmonton.*
- 1860 Canliffa, Roger, Esq. 24, *Lombard-street, E.C.; and 10, Queen's-gate, S. Kensington, W.*
- 1859 Cunningham, H. D. P., Esq., R.N. *Bury, near Gosport, Hants.*
- 1853 Cunningham, John Wm., Esq., Sec. King's College. *Somerset-house, W.C.; and Harrow, N.W.*
- 1843 *Curstjee, Manockjee, Esq., F.R.S.M.A. *Villa-Bucalla, Bombay.*
- 1839 *Curtis, Timothy, Esq.
- 1861 Dalrymple, F. Elphinstone, Esq., India Civil Service. *Albemarle Hotel, Albemarle-street, W.*
- 1857 180 Dalton, D. Foster Grant, Esq. *Parkstone, near Poole; and Shanks House, near Somerset.*

Year of
Election.

- 1859 Dalyell, Robt. Alex. Osborn, Esq. *H.M.'s Consul-General, Erasmus ; and Royal Hospital, Greenwich, S.E.*
- 1851 *Daniell, Wm. Freeman, Esq., M.D., F.R.S. *Junior U.S. Club, S.W.*
- 1858 *Darwin, Charles, Esq., M.A., F.R.S. *Athenaeum Club, S.W. ; and Down, near Bromley, Kent.*
- 1860 Daseant, John Bury, Esq. 22, Warwick-road, Maiden-hill, W.
- 1861 Davies, Herbert, Esq., M.D. 23, Finsbury-square, E.C.
- 1858 Davies, William, Esq.
- 1858 Davis, Dr. Francis William, Assist.-Surgeon R.N. *H.M.'s Ship 'Marlborough' ; and Lurganboy House, Manor Hamilton, Ireland.*
- 1861 Davis, John Edward, Esq., R.N. *Admiralty Survey, Plymouth.*
- 1846 Davis, Sir John Francis, Bart., K.C.B., F.R.S., F.R.S.N.A. *Athenaeum Club, S.W. ; and Hollywood, near Bristol.*
- 1840 390 *Dawney, the Hon. Payan. *Beningborough-hall, Necton-upon-Ouse, Yorkshire.*
- 1859 De Blaquiere, John, Lord. 16, Norfolk-street, Park-lane, W.
- 1852 De Boinville, Chev. Alexander, K.L.H.
- 1858 De Bourgho, T. J., Esq. 8, Charing-cross, S.W.
- 1856 De Gex, William Francis, Esq. 8, Serle-street, Lincoln's-inn, W.C.
- 1853 De Grey and Ripon, George Frederick Samuel, Earl. 1, Carlton-gardens, S.W. ; and *Studley Royal, Ripon.*
- 1860 Denison, Alfred, Esq. 6, Albemarle-street, W.
- 1834 *Denison, His Excellency Sir William Thomas, Lieut.-Col. R.E., F.R.S. *Governor of Madras.*
- 1836 Denman, Capt. the Hon. Jas., R.N. 17, Eaton-terrace, S.W. ; and *H.M. Yacht.*
- 1833 *Derby, Edward Geoffrey, Earl of, P.C., F.R.S. 23, St. James's-square, S.W. ; and *Knowsley-park, Prescott, Lancashire.*
- 1854 400 *Deraux, Alexander, Esq. 2, Avenue-road, Regent's-park, N.W.
- 1860 Devine, Thomas, Esq., Chief of Surveys. *Quebec, Upper Canada.*
- 1837 *Devonshire, William Cavendish, Duke of, LL.D., D.C.L., M.A., F.R.S. *Devonshire House, Piccadilly, W. ; and Hardwick Hall, Derbyshire.*
- 1862 Dick, Capt. Charles Cramond. *Exeter, Devon.*
- 1861 Dick, Robert Kerr, Esq., Bengal Civil Service. *Oriental Club.*
- 1833 Dickenson, John, Esq., F.R.S., F.S.A. 39, Upper Brook-street, W. ; and *Abbott's-hill, Hemel-Hempstead.*
- 1852 Dickenson, John, Esq., jun. *Clarence Chambers, 12, Haymarket, S.W. ; and Abbott's-hill, Hemel-Hempstead.*
- 1854 *Dickenson, Sebastian Stewart, Esq., Barrister-at-Law. *Brown's-hill, Stroud, Gloucestershire.*
- 1860 Dickinson, Rev. C. S. Allen, B.A. 86, Hamilton-ter., St. John's Wood, N.W.
- 1830 *Dickinson, Francis Henry, Esq., F.S.A. 8, Upper Harley-street, W. ; and *King-aston-park, Somerset.*
- 1860 410 Dickinson, Jas. Austen, Esq. 56, Upper Bagot-street, Dublin.
- 1859 Dickson, A. Benson, Esq. *Chapel Stairs, Lincoln's-inn, W.C.*
- 1858 Dickson, Charles Hammer, Esq. *H.B.M. Consul, Sukum Kald, Black Sea.*

Year of Election.	
1860	Dickson, Lieut.-Col. Lothian Sheffield. 10, <i>Stanhope-terrace, Hyde-park, W.</i>
1843	Dickson, Peter, Esq. 28, <i>Upper Brook-street, W.</i>
1860	Dietz, Bernard, Esq., of Algoa Bay. 3, <i>Dorset-square, W.</i>
1859	Digby, G. Wingfield, Esq. 35, <i>Brook-street, Grosvenor-square, W.</i> ; and <i>Sherrborne Castle, Dorset.</i>
1860	Digby, Lt.-Colonel John Almerus. 6, <i>Charles-street, Berkeley-square, W.</i>
1836	*Dilke, Charles Wentworth, Esq. 76, <i>Sloane-street, S. W.</i>
1845	*Dilke, Sir Charles Wentworth, Bart. 76, <i>Sloane-street, S. W.</i>
1859	430 *Dilke, Charles Wentworth. 76, <i>Sloane-street, S. W.</i>
1856	Dillon, the Hon. Arthur. 17, <i>Charges-street, W.</i>
1840	*Divett, Edward, Esq., M.P. <i>Bystock, near Exmouth, Devon.</i>
1861	Dixon, Lieut.-Colonel John. 4, <i>Craig's-court, S. W.</i>
1854	Dixon, W. Hepworth, Esq., F.R.S. <i>Emax Villa, Queen's-road, St. John's-wood, N. W.</i>
1857	Dobie, John, Esq., R.N. <i>Junior United Service Club, S. W.</i> ; and <i>Club Chambers, S. W.</i>
1857	Dobie, Robert, Esq., M.D., R.N. 7, <i>Houghton-place, Amptill-sq., Hampstead-road, N. W.</i>
1841	*Dodd, George, Esq., F.R.S. 9, <i>Grosvenor-place, S. W.</i>
1854	Dodson, John George, Esq., M.P. 6, <i>Seamore-place, Mayfair, W.</i>
1862	Dollen, Commr. Wm. Digby Mackworth, R.N. <i>H.M.S. 'Bloodhound,' W. Coast of Africa.</i>
1854	430 *Dollond, George, Esq. <i>St. Paul's Churchyard, E.C.</i>
1854	Domville, William T., Esq., M.D., R.N. <i>Army and Navy Club, S. W.</i>
1853	Donaldson, Sir Stuart A. 22, <i>Rutland-gate, S. W.</i> ; and <i>Sydney, Australia.</i>
1854	Donkin, Henry, Esq.
1858	Donne, John, Esq. 3, <i>Gordon-place, Gordon-square, W.C.</i>
1861	Donoughmore, R. J. Hely-Hutchinson, Earl of. 52, <i>South Audley-street, W.</i> ; <i>Knocklofty House, Tipperary</i> ; and <i>Palmerston House, near Dublin.</i>
1850	Dover, John William, Esq. 124, <i>Finchchurch-street, E.C.</i>
1854	Dower, John, Esq. 108, <i>Fleet-street, E.C.</i>
1853	Doyle, Sir Francis Hastings C., Bart. <i>Custom House, E.C.</i>
1845	*Drach, Solomon Moses, Esq., F.R.S. <i>At Mr. Morrice's, High-street, Watford, Herts.</i>
1846	440 Drummond, Lieut.-General John. <i>The Boyce, Dymock, Gloucestershire.</i>
1846	Drury, Capt. Byron, R.N. <i>Grove-road, Southsea.</i>
1851	*Du Cane, Major Francis, R.E. 64, <i>Loxwood-square, S. W.</i>
1851	*Ducie, Henry John, Earl, F.R.S. 30, <i>Princes-gate, S. W.</i>
1859	Ducket, Clark A., Esq., M.D., Surg. R.N. 33, <i>South Down-rd., Great Yarmouth.</i>
1859	Duckworth, Henry, Esq. 2, <i>Gambier-terrace, Liverpool.</i>
1860	*Duff, Mountstuart Elphinstone Grant, Esq., M.P. <i>Eden, near Bang, Scotland.</i>
1861	*Duncan, George, Esq. 45, <i>Gordon-square, W.C.</i>
1840	*Dundas, Right Hon. Sir David, Q.C. 13, <i>King's-Bench-walk, Temple, E.C.</i> ; and <i>Ochertyre, Co. Perth.</i>

Year of
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- 1840 Dunell, Henry James, Esq. 4, *Upper Hyde-park-gardens, W.*
- 1859 450 Dunlop, R. H. Wallace, Esq., C.B., *Indian Civil Service.*
- 1860 *Dunmore, Charles Adolphus Murray, Earl of. 17, *Carlton-house-terrace, S.W.*
- 1837 *Dunraven, Edwin Richard, Earl of, F.R.S. *Adare-manoir, Limerick; and Dunraven-castle, Glamorganshire.*
- 1856 Duprat, Chevalier Alfredo. *H.M.F. Arbitrator, Cape Town, Cape of Good Hope.*
- 1861 Dupr  , Thos. W., Esq., M.D. 21A, *Hanover-square, W.; and Panama.*
- 1852 D'Urban, Colonel W. J. *Deputy Quartermaster-General, Canada; and Junior U. S. Club, S.W.*
- 1861 Dyke, Commander Peche H., R.N. 3, *Southwick-place, Hyde-park, S.W.*
- 1858 Eaniley, Sir Culling E., Bart. 11, *Grosvenor-street, W.; and Bedwell-park, Hatfield.*
- 1857 Eardley, E. G. Culling, Esq. *Hungershall-park, Tunbridge Wells.*
- 1854 Eardley-Wilmot, Capt. A. P., R.N., C.B. *H.M.S. 'Nile,' Queensdown.*
- 1856 460 Eardley-Wilmot, Col. F., M.B.A. *Montreal, Canada.*
- 1857 Eastwick, Captain W. J. 12, *Leinster-terrace, Hyde-park, W.*
- 1861 Eber, General F. 43, *Jermyn-street, S.W.*
- 1858 Edge, Rev. W. J., M.A. *Benenden Vicarage, near Staplehurst, Kent.*
- 1861 *Edwards, Henry, Esq. 53, *Berkeley-square, W.*
- 1860 Edwards, Major James B., R.E. *Junior United Service Club, S.W.*
- 1860 Egerton, Colonel the Hon. Arthur. *Bridgewater-house, S.W.*
- 1857 Egerton, Commander Charles Randall, R.N. 7, *Rutland-gate, S.W.*
- 1853 Egerton, Captain the Hon. Francis, R.N. *Bridgewater-house, S.W.; and H.M.S. 'St. George.'*
- 1860 Elderton, Edward M., Esq. 40, *St. George's-road, Pinlicko, S.W.*
- 1859 470 Elgin and Kincardine, James Bruce, the Earl of, K.T., G.C.B. *Athenaeum Club, S.W.; and Broom Hall, Dumfermline.*
- 1861 Elkington, Alfred John, Esq. 22, *Regent-street, St. James's, S.W.*
- 1845 Ellenborough, Edward, Earl of, G.C.B. 12, *Upper Belgrave-street, S.W.; and Southam-house, near Cheltenham.*
- 1854 Ellesmere, George Granville Francis, Earl of, &c. &c. *Bridgewater-house, Cleveland-square, S.W.; and Woraley-hall, Lancashire.*
- 1861 Elliot, George, Esq., C.E. *The Hall, Houghton-le-Spring, near Fence Houses, Durham.*
- 1830 *Elliott, Rev. Charles Boileau, M.A., F.R.S. *Tuttingstone, Suffolk.*
- 1855 Elliott, Christopher, Esq., M.D. *Colombo, Ceylon.*
- 1858 Elphinstone, Major Howard C., R.E. *Buckingham Palace, S.W.*
- 1857 Elton, Sir Arthur H., Bart. *Athenaeum Club, S.W.; and Clevedon Court, Somersetshire.*
- 1830 Enderby, Charles, Esq., F.R.S., F.L.S. 13, *Great St. Helen's, E.C.*
- 1860 480 Enfield, Edward, Esq., F.S.A. 19, *Chester-terrace, Regent's-park, N.W.*
- 1856 Entwisle, John, Esq. 1, *Russell-square, W.C.*

Year of Election

- 1861 Erroll, William Harry Hay, Earl of. 3, *Grafton-street, W.*; *Pembroke Lodge, Richmond-park, S.W.*; and *Stuives Castle, Aberdeenshire.*
- 1852 Erskine, Rear-Admiral John Elphinstone, C.B. *H.M.S. 'Edgar'* 1 L, *Albany, W.*; and *Cardross, Stirling, N.B.*
- 1857 *Esmende, G. M. M., Esq. 29, *Park-street, Grosvenor-square, W.*
- 1850 Espinasse, Major J. W., 12th Regt. *Plymouth.*
- 1851 Evans, Rev. Charles. *Rugby.*
- 1857 *Evans, Frederic J., Esq., R.N., F.R.A.S. 4, *Wellington-terrace, Charlton, Blackheath, S.E.*
- 1830 *Evans, Rear-Admiral George. 1, *New-street, Spring-gardens, S.W.*; and *Englefield-green, Chertsey.*
- 1857 Evans, Thos. Wm., Esq., M.P. 7, *Stratford-place, W.*; and *Allentree Wall, Derby.*
- 1830 490* Evans, W. Esq.
- 1861 Evelyn, Lt.-Colonel George P. *Army and Navy Club, S.W.*
- 1851 *Evelyn, William J., Esq., F.R.S. *Wotton-house, near Dorking.*
- 1845 *Everest, Col. Sir Geo., Bengal Art., C.B., F.R.S., &c. 10, *Westbourne-street, Hyde-park, W.*
- 1830 *Everett, James, Esq., F.R.S.
- 1859 Ewart, William, Esq., M.P. 6, *Cambridge-square, W.*
- 1839 Ewer, Walter, Esq., F.R.S., F.L.S. 8, *Portland-place, W.*
- 1856 Ewing, J. D. Cram, Esq. 21, *Birken-lane, E.C.*
- 1857 Eyre, Edward J., Esq., Lt.-Gov. of Antigua, and *Dean-house, Eastone, Oxon.*
- 1861 Eyre, George E., Esq. 59, *Lowndes-square, S.W.*
- 1856 500 Eyre, Col. Vincent, C.B. *Athenaeum Club, S.W.*; and *India.*
- 1855 Fagan, Lieut.-Col. C. G., Bengal Army. *Gresham-house, Old Broad-street, E.C.*
- 1861 Fairbairn, William, Esq., C.E., F.R.S. *Manchester.*
- 1857 Fairholme, Lieut. Chas., R.N. *H.M.S. 'Megara'* and *York-ter., Leamington.*
- 1856 Fairholme, George Knight, Esq. *Union Club, S.W.*; and *Baronswood, Melrose, N.B.*
- 1838 Falconer, Thomas, Esq. *Uxá, Monmouthshire.*
- 1857 Falkland, Lucius Bentinck, Viscount. *Skutterskelfe, Yorkshire.*
- 1855 *Fanshawe, Capt. E. G., R.N. 27, *Rutland-gate, Hyde-park, S.W.*
- 1857 Farrer, Thomas H., Esq. *Board of Trade, S.W.*; and 21, *Chester-terrace, Regent's-park, N.W.*
- 1859 *Fayrer, Joseph, Esq., M.D. *India.*
- 1858 510 Fazakerley, J. N., Esq. 17, *Montagu-street, Portman-square, W.*
- 1856 Ferguson, William, Esq. *Gresham-house, Old-Broad-street, E.C.*; and 9, *Well-walk, Hampstead, N.W.*
- 1840 *Ferguson, James, Esq., F.R.A.S. 20, *Langham-place, W.*
- 1860 Ferro, Don Ramon de Silva, Chilean Consul Genl. 48, *Moorgate-street, E.C.*
- 1830 Findlay, Alexander, Esq. *Hayes, Kent, S.E.*
- 1844 Findlay, Alex. George, Esq. 53, *Fleet-street, E.C.*; and *Hayes, Kent, S.E.*
- 1859 Fisher, Anthony L., Esq., M.D. 14, *York-place, Baker-street, Portman-square, W.*

Year of
Election.

- 1859 Fisher, Robert, Esq. 46a, Pall-mall, S.W.; and Parthenon Club, S.W.
- 1861 Fitton, E. Brown, Esq. 6, Gloucester-crescent, Hyde-park, W.
- 1857 *Fitzclarence, Lieut. the Hon. George, R.N. 1, Addison-road, Kensington, W.
- 1861 520 Fitzgerald, Captain Keane, 2, Portland-place, W.
- 1860 Fitzmaurice, Lieut. the Hon. Frederick. 6, Princes-square, W.
- 1859 Fitz-Roy, George Henry, Esq. 51, Portland-place, W.
- 1850 Fitz-Roy, Rear-Admiral Robert, F.R.S. Board of Trade, S.W.; Athlone Club, S.W.; and 38, Onslow-sq., Brompton, S.W.
- 1857 Fitzwilliam, the Hon. C.W., M.P. 60, St. James's-street, S.W.
- 1837 *Fitzwilliam, William Thomas, Earl. 4, Grosvenor-square, W.; and Wentworth House, Rotherham, Yorkshire.
- 1861 *Fleming, John, Esq. 7, Mincing-lane, E.C.
- 1853 *Flemyng, Rev. Francis. Kilmore End, Henley-on-Thames.
- 1857 Fletcher, Thomas Kedley, Esq. Union-dock, Limehouse, E.
- 1861 Foord, John Bromley, Esq. 52, Old Broad-street, E.C.
- 1860 530 Forbes, the Hon. Horace Courtenay. 4, St. Andrew's-place, Regent's-park, N.W.
- 1845 Forster, Rev. Charles, B.D. Stisted Rectory, Essex.
- 1839 *Forster, William Edward, Esq. Burley, near Otley.
- 1861 Forsyth, William, Esq., Q.C. 61, Rutland-gate, S.W.
- 1858 Fortescue, Chichester S., Esq., M.P. 45, St. James's-place, S.W.
- 1861 *Fortescue, Hon. Dudley F., M.P. 17, Grosvenor-square, W.
- 1841 *Fowler, Rear-Admiral Robert M. Wallscote-house, Pangbourne.
- 1850 *Fowler, Robert N., Esq., M.A. 50, Cornhill, E.C.; and Tottenham, N.
- 1861 Fox, Arthur Douglas, Esq., C.E. 20, Charges-street, Mayfair, W.; and 8, New-street, Spring-gardens, S.W.
- 1859 Fox, Lieut.-Colonel A. Lane. Park-hill, Clapham, S.
- 1830 540 *Fox, Lt.-Gen. C.R. Travellers' Club, S.W.; and 1, Addison-rd., Kensington, W.
- 1860 Fox, Thos., Esq., M.D. Inspector-General of Hospitals, North Camp, Aldershot.
- 1860 Franks, Charles W., Esq. 5, John-street, Berkeley-square, W.
- 1854 Fraser, Charles, Esq. 38, Conduit-street, W.
- 1830 Fraser, Major-General John, R.E. Deputy Quartermaster-General, Ceylon.
- 1860 Fraser, Thomas, Esq. Literary Secretary, Hudson Bay Company, Hudson Bay House, E.C.
- 1860 Freeman, Daniel Alexander, Esq., Barrister-at-law. Upper Tooting, S.
- 1859 Freeman, H. Standhope, Esq. 4, Royal-crescent, Notting-hill, W.
- 1856 Fremantle, Rt. Hon. Sir Thomas F., Bart. 4, Upper Eclleston-street, Belgrave-square, S.W.
- 1852 French, Dr. James, C.B. Inspector-General of Hospitals, Graham's Hotel, Edinburgh.
- 1850 550 Frere, Bartle J. L., Esq. 45, Bedford-square, W.C.
- 1839 *Frere, George, Esq., jun. Cape of Good Hope; and 45, Bedford-square, W.C.
- 1842 Frere, William Edw., Esq., F.R.S. Bombay; and 45, Bedford-square, W.C.
- 1853 Frith, John Griffith, Esq. 13, Wimpole-street, W.; and 11, Austin Friars, E.C.
- 1859 Fryer, William, Esq. 10, Marlborough-hill-gardens, St. John's Wood, N.W.

Year of Election.	
1855	Fuller, John, Esq. 9, Vere-street, Oxford-street, W.
1860	Fusell, Rev. J. G. Curry. 16, Chalgon-place, S. W.
1861	Fynes Clinton, Rev. Charles J., M.A. 39, Bedford-square, W.C.; and Cromwell, Notts.
1855	*Gabriel, Edmund, Esq. H.M.'s Commissioner, St. Paul de Loando; and 44, Charing-cross, S. W.
1845	*Gage, Admiral Sir William Hall, G.C.H., K.C.B. Thurston Cottage, Bury St. Edmund's, Suffolk.
1858	560 Galsford, Thomas, Esq. Travellers' Club, S. W.
1861	Gallagher, John, Esq., M.D. Reform Club, S. W.; and 109, Westbourne-terrace, W.
1856	*Galloway, John James, Esq.
1848	*Galton, Capt. Douglas, R.E. 12, Chester-street, Grosvenor-place, S. W.
1850	*Galton, Francis, Esq., M.A., F.R.S. 42, Rutland-gate, S. W.; and 5, Bertie-terrace, Leamington.
1854	*Gammell, Major Andrew. Drumtochty, Kincardineshire, N. B.
1859	Gammie, George, Esq. Shotover House, Wheatley, Oxon.
1861	Garden Major Robert Jones. 63, Montagu-square, W.
1833	Gascolgne, Capt., Ceylon Rifles. Athenæum Club, S. W.
1859	*Garniot, John P., Junr., Esq. 6, Sussex-place, Regent's-park, N. W.
1858	570 Gausson, William, Esq. 12, Montagu-place, Russell-square, W. C.
1838	*Gawler, Colonel George, K.H. United Service Club, S. W.; and Kent-lodge, Southsea.
1859	Gerstenberg, Isidore, Esq. 11, Wornford-court, Throgmorton-street, E. C.
1859	*Gibbs, H. Hicks, Esq. St. Dunstan's, Regent's-park, N. W.
1853	Gifford, George, Earl of, M.P. 2, Wilton-street, Grosvenor-place, S. W.
1857	Gilchrist, John, Esq. 48, Porchester-terrace, W.
1855	Gillespie, Alexander, Esq. Heathfield, Hertham, Fisher, Surrey.
1857	Gillespy, Thomas, Esq. Brabant-court, Philpot-lane, E. C.
1861	Gilliat, Alfred, Esq. Longham-house, near Wimborne, Dorset.
1857	Gilmore, Lieut. A. H., R.N. H.M.S. 'Renown,' Channel Squadron.
1836	580 Gladdish, William, Esq. Bycliffes, Gravesend.
1846	*Gladstone, William, Esq. 57½, Old Broad-street, E. C.
1860	Glascott, Lieut. Adam Giffard, R.N., Acting Commissioner on the Turko-Persian Frontier. British Embassy, St. Petersburg.
1857	Gleig, Rev. G. R., M.A. Chaplain-General, Chelsea-hospital, S. W.
1854	Glen, Joseph, Esq., M.D., Mem. Geogr. Soc. of Bombay. Oriental Club, W.
1857	Gleane, John S. Stuart, Esq., F.S.A., Barrister-at-law. Reform Club, S. W.; and 6, Stone-buildings, Lincoln's-inn, W. C.
1861	Gloucester and Bristol, William Thomson, Bishop of. The Palace, Gloucester; and Stapleton Palace, Bristol.
1857	Glover, Lieut. John H., R.N. Army and Navy Club, S. W.
1860	Glyn, Commr. H. Carr, R.N. 1, Eccleston-street, Belgrave-square, S. W.

Year of Election.

- 1858 Glyn, Pascoe Charles, Esq. *Gresham-house, 62, Old Broad-street, E.C.; and 15, St. George's-road, Eccleston-square, S.W.*
- 1862 590 Goddard, James, Jun., Esq. 14, *Mincing-lane, E.C.*
- 1858 Goldsmid, Frederick D., Esq. 50, *Harley-street, W.*
- 1861 Goldsmid, Julian, Esq. 20, *Portman-square, W.*
- 1861 Goodin, Joseph, Esq. 22, *Leinster-gardens, Hyde-park, W.*
- 1860 Gooch, Thomas Longridge, Esq. 101, *Inverness-terrace, Raymester, W.*
- 1856 Gordon, Alexander, Esq., C.E. 27a, *Sutherland Street, Finsbury, S.W.*
- 1856 *Gordon, Colonel the Hon. Alexander H., C.B. *Argyll-house, Regent-street, W.*
- 1860 Gordon, the Honourable Arthur. 7, *Argyll-street, W.*
- 1858 Gordon, Capt. Charles G., R.E. *Hong Kong, China.*
- 1860 Gordon, Rev. Cosmo Reid, M.A., F.R.S. 78, *Dorset-street, Hulme, Manchester.*
- 1854 600 Gordon, Harry George, Esq. 1, *Clifton-place, Hyde-park-gardens, W.; and Killychassie, Dunkeld, Perthshire.*
- 1856 Gordon, James Wilkinson, Esq.
- 1856 Gordon, Vice-Admiral the Honourable John. 28, *Queen Anne-street, W.*
- 1853 Gordon, Vice-Admiral Robert. *United Service Club, S.W.*
- 1853 Gore, Montagu, Esq. *Palace Chambers, 28, St. James's-street, S.W.*
- 1853 Gore, Richard Thomas, Esq. 6, *Queen-square, Bath.*
- 1853 Gorman, John, Esq., M.D. *Mark-lane, E.C.*
- 1854 Gosling, Fred. Solly, Esq. 18, *New-street, Spring-gardens, S.W.*
- 1862 Goss, Samuel Day, Esq., M.D. 161, *Southwark Bridge-road, S.E.*
- 1855 Gould, Lieut.-Colonel Francis A., R.E. *Duntingford, Herts.*
- 1846 610 Gould, John, Esq., F.R.S., F.L.S. 26, *Charlotte-street, Bedford-square, W.C.*
- 1860 Gould, Nathaniel, Esq., F.R.S. 4, *Tavistock-square, W.C.*
- 1850 *Gowen, James Robert, Esq. 4, *Oxbrington-place, Western-road, Brighton.*
- 1858 Graham, Cyril C., Esq. *Delce-house, Watford, Herts.*
- 1861 Grant, Alexander, Esq. *Oakfield House, Horsey, N.*
- 1861 Grant, Daniel, Esq. 11, *Warwick-road, Upper Clapton, N.*
- 1860 Grant, Capt. James A. *Dingyall, Rushmore, N.B.; and East African Expedition.*
- 1857 Grant, Capt. W. C., 2nd Dragoon Guards. *Junior U. S. Club, S.W.; and Brigade Major, Lucknow.*
- 1861 Grant, Colonel W. L., care of Capt. Ellis, *Army and Navy Club, S.W.*
- 1860 Grantham, Capt. James, R.E. *Natal, S. Africa.*
- 1830 620 *Gray, John Edw., Esq., PH.D., F.R.S., Z.S. and L.S. *British Museum, W.C.*
- 1861 Green, Capt. Francis. *South Camp, Aldershot; and 89, Eccleston-square, S.W.*
- 1830 Greene, Thomas, Esq. *Whittington-hall, near Burton, Westmoreland.*
- 1857 *Greenfield, W. B., Esq. 2, *Portchester-terrace North, W.*
- 1858 *Gregory, Augustus Chas., Esq. *Sydney.*
- 1858 Gregory, Charles Hutton, Esq., C.E. 1, *Delahay-street, Westminster, S.W.*
- 1860 Gregory, Francis Thomas, Esq. *Survey Department, W. Australia; and Cattle-hill, Wycombe.*
- 1858 *Gregory, Isaac, Esq. *Chorlton Hall, Victoria-park, Manchester.*
- 1861 *Gregson, Samuel, Esq., M.P. 32, *Upper Harley-street, W.*

Year of
Election.

- 1837 *Grellet, Henry Robert, Esq. 7, *Lloyd-street, Lloyd-square, E.C.*
- 1859 630 Grenfell, Chas. Pascoe, Esq., M.P. 38, *Belgrave-square, S.W.*
- 1858 Grenfell, Pascoe St. Leger, Esq. *Mosley-house, Swansea.*
- 1853 Grenfell, Riversdale W., Esq. 27, *Upper Thames-street, E.C.*
- 1830 *Greswell, Rev. Richard, M.A., F.R.S. 39, *St. Giles, Oxford.*
- 1837 *Grey, Sir George, K.C.B. *Governor & Commander-in-Chief, New Zealand.*
- 1844 *Grey, Ralph Wm., Esq. 47, *Belgrave-sq., S.W.; and Chipchase-castle, Hexham.*
- 1861 *Griffith, Daniel Clewin, Esq. 10, *Gower-street, W.C.*
- 1839 Griffith, John, Esq. 16, *Finchbury-place South, E.C.*
- 1836 Griffith, Richard Clewin, Esq. 10, *Gower-street, Bedford-square, W.C.*
- 1859 Grimston, the Hon. and Rev. Francis S. *Wakes Colne, Halstead.*
- 1855 640 Grinstead, R. B., Esq., M.D., M.D., F.L.S., &c. *Townsend-house, Malvern.*
- 1861 Grosvenor, Lord Richard. 33, *Upper Grosvenor-street, W.*
- 1858 Grote, George, Esq. 13, *Seville-row, W.*
- 1857 Grunseisen, Charles Lewis, Esq. 16, *Surrey-street, Strand, W.C.*
- 1862 Gunn, F. L. G., Esq., Army Medical Staff; *Bathurst, Gambia, W. Africa.*
- 1861 Gussell, Commander Edmund H., R.N. *Army and Navy Club, S.W.*
- 1830 *Gurney, Hudson, Esq., F.R.S., F.R.A., F.R.S.N.A. 9, *St. James's-square, S.W.; and Kenwick-hall, near Norwich.*
- 1859 *Gurney, John H., Esq., M.P. 24, *Kensington Palace Gardens, W.*
- 1857 Gurney, Samuel, Esq., M.P. 25, *Princes-gate, Hyde-park, S.W.; and Carshalton, Surrey.*
- 1860 Haliday, Colonel William Robert, 36th Regt. *Curragh Camp; and Cox and Co., Craig's-court, S.W.*
- 1853 650 *Halkett, Rev. Dunbar S. *Little Bookham, Surrey.*
- 1853 *Halkett, Lieut. Peter A., R.N. *Wyndham Club, S.W.*
- 1861 Hall, Charles Hall, Esq. 10, *Mansfield-st., W.; and Watergate, near Ensworth.*
- 1862 Hall, James Tebbutt, Esq. *Fore-street, Linchouse, E.; and 3, Crane-grove, Holloway, N.*
- 1853 Hall, Captain William Hutcheson, R.N., C.B., F.R.S. *United Service Club, S.W.; and 48, Phillimore-gardens, Kensington, W.*
- 1854 Halloran, Alfred L., Esq., Master R.N. *Tamerton Foliot, near Plymouth.*
- 1858 Halloran, Arthur B., Esq. *Principal of the South Devon Collegiate School, Henri-tres, Exeter.*
- 1861 Hamilton, Lord Claude. 19, *Eaton-sq., S.W.; and Barons Court, Co. Tyrone.*
- 1857 Hamilton, Edward, Esq., M.D. 22, *Grafton-street, W.*
- 1857 Hamilton, Edward Terrick, Esq. 32, *Upper Brook-street, W.*
- 1830 660 *Hamilton, Capt. Henry G., R.N. 71, *Eccleston-square, S.W.*
- 1861 Hamilton, Capt. Robert William, Grenadier Guards. 18, *Eccleston-square, S.W.*
- 1830 Hamilton, Terrick, Esq. 121, *Park-street, Grosvenor-square, W.*
- 1846 Hamilton, Rear-Admiral W. A. Baillie. *Mowartney-house, Blackheath, S.E.*
- 1837 Hamilton, Wm. John, Esq., F.R.S. 23, *Chesham-place, S.W.*
- 1830 Hammersley, Charles, Esq. 25, *Park-crescent, Portland-place, W.*

Year of
Election.

- 1858 Hammond, Rev. J. W., *B.A.*, Fellow of St. John's College, Oxford. *Reform Club, S. W.*
- 1862 *Hannbury, Robert, Esq., *M.P.* 10, *Upper Grosvenor-street, W.*
- 1863 *Hans, Captain George S., *R.N.* *United Service Club, S. W.*; and *H.M.S. 'Simpson.'*
- 1866 *Handley, Benjamin, Esq., Assistant-Commr. Turko-Persian Frontier. *British Embassy, St. Petersburg.*
- 1861 670 *Hankey, Blake Alexander, Esq. 38, *Portland-place, W.*
- 1867 Hankey, Thomson, Esq., *M.P.* 45, *Portland-place, W.*
- 1867 *Hannner, Sir J., *Bart.*, *M.P.*, *F.R.S.* *Hannner-hall and Bettisfield-park, Flintshire.*
- 1869 *Hansard, Henry, Esq. 14, *Park-square, Regent's-park, N. W.*
- 1861 Hanson, Rev. Augustus William, British Consul. *Sherboro.*
- 1849 *Harcourt, Egerton V., Esq. *Whitwell-hall, York.*
- 1853 Harcourt, Rear-Admiral Octavius Vernon. 29, *Devonshire-place, Portland-place, W.*; and *Swinton-park, Redale, Yorkshire.*
- 1861 Hardinge, Henry, Esq., *M.D.* 18, *Grafton-street, Bond-street, W.*
- 1865 Harris, the Hon. and Rev. C. A. *Bouham's Passage, Southampton.*
- 1863 Harris, Capt. the Hon. E. A. J., *R.N.* *H.B.M.'s Minister Plenipotentiary, Berne.*
- 1852 680 Harris, George Frederick, Esq., *M.A.* *Harrow-park, Middlessex, N. W.*
- *1859 Harris, Capt. Henry, *R.C.S.* 35, *Gloucester-terrace, Hyde-park, W.*
- 1859 Harrison, C. H. Rogers, Esq., *F.R.C.S.* 13, *Lansdowne-road, Clapham-road, S.*
- 1859 Harrison, George Murah, Esq. 10, *Lansdowne-road Villas, Notting-hill, W.*
- 1838 Harrowby, Dudley, Earl of. *Sandon-ho., Lichfield*; and *Nocton, Gloucestershire.*
- 1864 *Hartland, Frederick D., Esq., *F.R.A., &c.* *The Oaklands, near Cheltenham.*
- 1846 Harvey, W. S., Esq., *R.N.* *H.M.S. 'Hannibal,' Mediterranean*; and 40, *Charing-cross, S. W.*
- 1859 Harwood, H. Harwood, Esq. 29, *Cleveland-square, Hyde-park, W.*
- 1858 Hawker, Edward J., Esq. 37, *Cudoyan-place, W.*
- 1844 Hawkins, Bisset, Esq., *M.D.*, *F.R.S.* 29, *Upper Harley-street, W.*; and *Levell Lodge, Dorchester.*
- 1857 690 Hawkins, Commander Frank K., *R.N.* *Army and Navy Club, S. W.*
- 1840 *Hawkins, John, Esq.
- 1858 *Hawkins, Lieut.-Col. J. Summerfield, *R.E.* *N. W. American Boundary Commission.*
- 1861 Hawksley, Thomas, Esq., *C.E.* 19, *Upper Woburn-pl., Twickenham, W.C.*
- 1860 Haworth, Frederick, Esq. 9, *Ecceleston-street, S. W.*
- 1830 Hawtrej, Rev. Edward Craven, *D.D.*, *F.R.A.* *Eton College.*
- 1852 *Hay, Capt. Sir J. C. Dalrymple, *R.N.* *U. S. Club, S. W.*; *Dunraght, Glenhuc*; and *Harrow-on-the-hill, N. W.*
- 1859 Hay, Major W. E. *Pitfear Castle, Perth.*
- 1853 Hayward, Robert Newton, Esq. *Porchester-villa, Grange-loam, Edinburgh.*
- 1862 Head, Alfred, Esq. *Cranen-hill, Baywater, W.*
- 1859 700 Heard, G. G. Gilbert, Esq., *F.R.A.* 18, *Devonshire-terrace, Hyde-park, W.*
- 1856 Heath, J. Benjamin, Esq., *F.R.E.*, *F.R.A.*, Consul for Sardinia. 31, *Old Jersey, E.C.*
- 1861 Hector, Alexander, Esq. 6, *Stanley Gardens, Baywater, W.*
- 1861 Hector, James, Esq., *M.D.*

Year of Election.	
1850	Hellmann, Christian, Esq. <i>Club-chambers, Regent-street, S.W.</i>
1859	Hely, Horendon, Esq. <i>Australian Club, Sydney.</i>
1856	Henderson, Andrew, Esq. <i>102, Gloucester-place, Portman-square, W.</i>
1837	*Henderson, James, Esq. <i>Littlewood-park, Forbes, Aberdeenshire.</i>
1853	Henderson, John, Esq. <i>Conservative Club, S.W.; and Valparaiso.</i>
1852	Henderson, William, Esq. <i>5, Stanhope-street, Hyde-park-gardens, W.</i>
1844	710 *Heneage, Edward, Esq. <i>Stag's End, Hemel Hempstead.</i>
1861	Henn, Rev. J. <i>Commercial Schools, Manchester.</i>
1860	Hennessey, J. B. N., Esq. <i>1st Asst. Trig. Survey of India, Dehra in the Doon, N.W. Provinces, India.</i>
1838	*Henry, Wm. Chas., Esq., M.D., F.R.S. <i>Haffield, near Ludbury, Herefordshire.</i>
1861	*Henty, Douglas, Esq. <i>Chichester.</i>
1834	Herbert, Jacob, Esq. <i>Trinity-house, Tower-hill, E.C.</i>
1857	Herd, Captain D. J. <i>2, Norway-house, Lincolns, E.</i>
1858	Hertslett, Edward, Esq. <i>Librarian, Foreign Office, S.W.; and Belle Vue-house, Richmond, S.W.</i>
1841	Hessey, James Augustus, Esq. <i>26, Addison-road, Kensington, W.</i>
1861	Heugh, John, Esq. <i>Furwood, Alderley Edge, Cheshire.</i>
1858	720 Hewett, Capt. J. A. Napier. <i>Rose-bank, Coleford, Gloucestershire.</i>
1859	Hewitt, James, Esq. <i>Nutfield, Redhill.</i>
1859	Hewitt, Commander William Nathan Wright, R.N. <i>H.M.S. 'Viper,' W. Coast of Africa.</i>
1840	*Heywood, James, Esq., M.P., F.R.S. <i>Athenæum Club, S.W.; and 26, Kensington Palace Gardens, W.</i>
1860	Heyworth, Captain Lawrence, 4th Royal Lancashire. <i>India.</i>
1853	Hickey, Edwin A., Esq. <i>Beech Hurst, Haywards Heath.</i>
1856	Hill, Arthur Bowdler, Esq. <i>South-road, Clapham-park, Surrey, S.</i>
1857	Hill, Rev. Charles C. <i>South-road, Clapham-park, Surrey, S.</i>
1854	Hill, Lieut.-Colonel Stephen J. <i>Army and Navy Club, S.W.; and Governor and Commander-in-Chief, Sierra Leone.</i>
1861	Hilliard, Capt. George Towers, Madras Staff Corps. <i>43, Upper Seymour-street, Portman-square, W.</i>
1858	730 Hinchliff, T. Woodbine, Esq., Barrister-at-Law. <i>64, Lincoln's-inn-fields, W.C.</i>
1860	Hind, Professor Henry Youle, M.A. <i>Toronto, Canada West.</i>
1846	*Hindmarsh, Frederick, Esq. <i>17, Ducklowsbury, E.C.</i>
1861	Hoare, Deane John, Esq. <i>45, Great Marlborough-street, W.; and R. T. Y. Club, Albemarle-street, W.</i>
1861	Hoare, Matthew Edward, Esq. <i>7, Belgrave-place, Brighton.</i>
1846	Hobbs, J. S., Esq. <i>157, Leadenhall-street, E.C.</i>
1855	Hobbs, Wm. Geo. Ed., Esq. <i>Master of Grammar School, Wareside, near Ware.</i>
1830	*Hobhouse, Henry William, Esq. <i>24, Cadogan-place, S.W.</i>
1861	Hodgins, J. George, Esq., Chief Asst. Depart. of Public Instr. <i>Toronto, Upper Canada.</i>
1834	*Hodgkin, Thomas, Esq., M.D. <i>28, Bedford-square, W.C.</i>

Year of
Election.

- 1856 740* Hodgson, Arthur, Esq., Superintendent of the Australian Agricultural Company.
1861 Hodgson, James Stewart, Esq. 8, *St. Helen's-place, E.C.*
1857 Hodgson, Kirkman Daniel, Esq., M.P. 8, *St. Helen's-place, Bishopsgate, E.C.*
1856 Hogg, James, Esq., Jun. 18, *St. Andrew's-square, Edinburgh.*
1830 Hogg, John, Esq., M.A., F.R.S., F.L.S., Foreign Sec. R. Soc. of Literature.
8, *Sergeants' Inn, Temple, E.C.*; and *Norton-house, Stockton-upon-Tees.*
1859 *Holford, Robert S., Esq., M.P. *Dorchester-house, Park-lane, W.*
1830 Holland, Sir Henry, Bart., M.D., F.R.S. 25, *Lower Brook-street, W.*
1861 Holland, Colonel James. 24, *Princes-square, Kensington-gardens, W.*
1861 *Hollingsworth, John, Esq., M.R.C.S. *Bealey-place, Greenwich, S.E.*
1861 Holme, J. Wilson, Esq., M.A. *Beckenham, Kent, S.E.*
1835 750* Holmes, James, Esq. 4, *New Ormond-street, Queen-square, W.C.*
1862 Holmes, Sir William W. 4, *Southwick-place, Hyde-park, W.*
1861 Holms, John, Esq. 9, *Petersham-terrace, South Kensington, W.*
1859 *Holroyd, Arthur Todd, Esq., M.D., F.L.S. *Athenæum Club, S.W.*
1857 Holroyd, Henry, Esq., Barrister-at-Law. 2, *Elm-court, Temple, E.C.*
1857 Homfray, Frederick Samuel, Esq., C.E. 6, *Storey's-gate, S.W.*
1857 Homfray, William Henry, Esq. 6, *Storey's-gate, S.W.*
1859 *Hood, William Charles, Esq., M.D. *Bethlehem Hospital, S.*
1830 *Hooker, Sir Wm. J., K.H., Ph. D., LL.D., F.R.S., F.S.A., &c. *West-park, Kew, W.*
1861* Hopcraft, George, Esq. 3, *Billiter-square, E.C.*
1846 760* Hope, Alex. James Beresford, Esq. *Arklow House, Connaught-place, Hyde-
park, W.*; and *Bedgebury-park, Hurst-green, Kent.*
1857 Hoper, Richard, Esq. 53, *Margaret-street, Carey-street-square, W.*; and *Cowfold,
Horsham, Sussex.*
1861 Hoskins, Conant. A. H., R.N. *Army and Navy Club, S.W.*
1853 Hoskins, George Alex., Esq. *Athenæum Club, S.W.*
1859 Hoskyns, Charles Wren, Esq. *Wroxhall Abbey, Wiltshire.*
1858 Hote, Capt. Sir William, Bart., R.N. *United Service Club, S.W.*
1856 Hoyell, William Hilton, Esq. *Goulburn, New South Wales.*
1853 Howard, Sir Ralph, Bart. 17, *Belgrave-sq., S.W.*; and *Bushy-park, Wicklow.*
1857 Howard, Samuel Lloyd, Esq. *Goddings, Loughton, Essex.*
1842 *Hubbard, J. Geilbrand, Esq., M.P. 24, *Prince's-gate, Hyde-park South, S.W.*
1857 770 Hughes, Capt. Sir Frederic. *Ely-house, Wexford.*
1838 Hughes, William, Esq. 48, *Thornhill-square, Islington, N.*
1838 *Hume, Edmund Kent, Esq.
1860 *Hume, Hamilton, Esq. *Cooma Yass, New South Wales.*
1857 Hunt, Zachariah Daniel, Esq. *Aylebury.*
1860 Huskisson, Wm. H. Tighman, Esq. *Eartham, near Chichester.*
1858 Hutchinson, Consul Thomas J. *The Rovery, Broadway, Wexford.*
1851 Hyde, James Bartlet, Esq. *Conservative Club, S.W.*
1860 *Hyde, Captain Samuel. 8, *Billiter-square, E.C.*

Year of Election.	
1852	Illingworth, Richard Stouhewer, Esq. 9, <i>Norfolk-crescent, Hyde-park, W.</i>
1850	780* Imray, James Frederick, Esq. 102, <i>Minories, E. ; and Bechenham, Kent, S.E.</i>
1861	*Ingall, Samuel, Esq. 1, <i>Old Broad-street, E.C. ; and Forest-hill, Kent, S.E.</i>
1860	Ingilby, the Rev. Henry John. <i>Ripley Castle, Ripley, Yorkshire.</i>
1851	Inglefield, Captain Edward A., R.S., F.R.S. <i>United Service Club, S.W.</i>
1846	Ingram, Hughes Francis, Esq. <i>University Club, S.W.</i>
1860	*Inskip, G. H., Esq., Master R.N. <i>H.M. Surveying Vessel 'Seaflower' ; and 23, Anne-street, Sunderland.</i>
1852	*Inskip, Rev. Robert Mills. 8, <i>Boon's-place, Plymouth.</i>
1840	*Irby, Frederick W., Esq. <i>Athenaeum Club, S.W.</i>
1853	Irring, Thomas, Esq. 5, <i>Belitha-villas West, Barnbury-park, N.</i>
1850	Jackson, William, Esq.
1855	790 Jackson, William, Esq., M.P. <i>Fenton's Hotel, S.W.</i>
1857	James, Colonel Sir Henry, R.S., F.R.S. <i>Superintendent Ordnance Survey, Southampton.</i>
1861	James, William Bosville, Esq. 13, <i>Bloomfield-road, Maiden-hill, W.</i>
1859	*Janson, T. Corbyn, Esq. <i>Stamford-hill, N.</i>
1857	Jefferson, Richard, Esq. <i>Army and Navy Club, S.W.</i>
1860	*Jejeebhoy, Sir Jamssetjee, Bart. <i>Bombay.</i>
1854	Jellicoe, Charles, Esq. 23, <i>Chester-terrace, N.W.</i>
1859	Jencken, H. Diedrich, Esq. 1, <i>Brick-court, Temple, E.C. ; and 2, York-terrace, Upper Sydenham, S.E.</i>
1854	Jenkins, Capt. Griffith, L.N., C.R. <i>East India Club, St. James's square, S.W.</i>
1837	*Jenkins, R. Castle, Esq. <i>Beachley, near Chepstow.</i>
1851	800 Jennings, John, Esq., M.A.S.
1854	*Jennings, William, Esq., M.A. 13, <i>Victoria-street, Westminster, S.W.</i>
1862	Jerdein, John, Esq. 2, <i>Stafford-street, Bond-street, W.</i>
1858	*Jernyn, the Venerable Archdeacon Hugh Willoughby. <i>Nettlecombe Rectory, near Taunton, Somerset.</i>
1860	Jernyn, Rowland Formby, Esq. <i>War Office, S.W.</i>
1860	Jessopp, Rev. Augustus, M.A., Head Master, <i>King Edward VI. School, Norwich.</i>
1858	Johnson, Capt. Clement. <i>Carlton Club, S.W. ; and 1, Whitehall, S.W.</i>
1847	Johnson, Edmund Chas., Esq. 20, <i>Arlington-street, S.W. ; and 6, Sunble-row, W.</i>
1859	*Johnson, Henry, Esq. 39, <i>Crutched Friars, E.C.</i>
1854	Johnson, John Hugh, Esq.
1861	810 Johnson, William, Esq. <i>R. T. F. Club, 7, Albemarle-street, W.</i>
1843	Johnston, Alex. Keith, Esq., F.R.S.E., Hon. Mem. <i>Berl. Geog. Soc., etc. March-hall park ; and 4, St. Andrew-square, Edinburgh.</i>
1856	Johnston, A. R., Esq., F.R.S. <i>Athenaeum Club, S.W. ; and 25, Mount-street, W.</i>
1857	Johnston, J. Brookes, Esq. 29, <i>Lombard-street, E.C.</i>
1858	Johnston, Capt. J. Gilbert. 8, <i>York-terrace, Regent's-park, N.W.</i>
1853	Johnstone, Sir John V. B., Bart., M.P., D.C.L. 27, <i>Grosvenor-square, W. ; and Hackness-hall, near Scarborough.</i>
1858	Jones, Capt. Edward Monckton, 20th Regt. <i>Brigade Office, Dover.</i>

Year of
Election.

- 1851 Jones, Lieut.-General Sir Harry D., R.E., K.C.B. *E. M. College, Farnborough Station, Hants.*
- 1857 Jones, Capt. Jenkin, Bombay Engineers. *1, Lennard-place, Circus-road, St. John's-wood, N.W.; and India.*
- 1861 Jones, John Pryce, Esq. *Grove-park School, Wrexham.*
- 1861 820 Jones, Sir Willoughby, Bart. *Crummer-hall, Fakenham, Norfolk.*
- 1840 *Kalergi, John, Esq. *22, Park-lane, W.*
- 1855 Kane, Major Fred. A. C., 15th Regt. Bombay *X. L. Junior U. Service Club, S. W.*
- 1858 Kay, David, Esq.
- 1838 Keane, Edward Arthur, Lord. *Moray-lodge, Campden-hill, Kensington, W.; and Stetchworth-park, Newmarket.*
- 1860 Kente, R. W., Esq., Lieutenant-Governor, *Trinidad.*
- 1857 Kenting, Sir Henry Singer, Q.C., M.P., one of the Judges of the Court of Common Pleas. *11, Prince's-gardens, S. W.*
- 1857 Keene, Rev. C. E. Ruck. *Synagogue-park, Henley-upon-Thames.*
- 1845 *Kellett, Commodore Henry, R.N., C.B. *Clonmel, Ireland.*
- 1861 Kelly, William, Esq. *6, Belgrave-street south, Pimlico, S. W.*
- 1860 830 Kemball, Major Arnold Burrowes, C.B., Indian Army. *H.M.'s Consul-General, Bagdad; and 6, Chester-place, Hyde-park, W.*
- 1860 Kendall, Henry, Esq., Consul for Peru. *11, New Broad-street, E.C.; and The Limes, Mortlake, S. W.*
- 1861 Kennard, Adam Steinmetz, Esq. *4, Lombard-street, E.C.*
- 1859 Kennard, Coleridge J., Esq. *14, Lombard-street, E.C.; and 13, Prince's-terrace, Prince's-gate, S. W.*
- 1861 Kennard, Robert William, Esq., M.P. *37, Porchester-terrace, Hyde-park, W.*
- 1861 Kennedy, Edward Shirley, Esq. *Maidenhead.*
- 1854 Kennedy, Rev. John, M.A. *4, Stepney-green, E.*
- 1851 Kent, John, Esq. *Shafston, Moreton Bay, Australia.*
- 1859 Key, Capt. Astley Cooper, R.N., C.B. *United Service Club, S. W.*
- 1862 Key, J. Binney, Esq. *Essex-house, West-hill, Putney, S. W.*
- 1857 840 Keysell, Francis P., Esq. *Sycamore Villa, 35, Carlton-hill, St. John's-wood, N. W.*
- 1846 King, Lieut.-Colonel Edward B., 36th Regt. *Junior United Service Club, S. W.*
- 1858 King, Rev. Samuel W., A.M. *Saxlingham Rectory, Norwich.*
- 1861 King, Major W. Ross, Unatt., F.S.A. Scot. *47, Wilton-crescent, Belgravia, S. W.; and Tartan House, near Blackburn, Aberdeenshire.*
- 1857 Kinkel, Gottfried, Esq., Ph.D. *23, Blomfield-road, Maida-hill, W.*
- 1857 *Kinnaird, Hon. Arthur F., M.P. *2, Pall-mall East, S. W.*
- 1860 Kinna, Samuel, Esq., Phil. Dr., F.R.S. *Highbury New Park College, N.*
- 1858 Kirk, John, Esq., M.D. *Livingstone Expedition.*
- 1861 Kirkland, Sir John. *17, Whitehall-pl., S. W.; and Foot's Cray-pl., Kent, S.E.*
- 1835 *Kjær, Thomas Andreas, Esq., Harbour-master. *St. Thomas, West Indies.*
- 1861 850 Knox, Thomas G., Esq. *4, Great Ryder-street, S. W.*
- 1861 Kjell, Hayes, Esq., M.B.C.S. *Wadebridge, Cornwall.*

Year of Election.	
1859	Labrow, Valentine, Esq. <i>Mitre-court, Temple, E.C.</i>
1860	Labuan, Right Rev. F. T. MacDougall, Bishop of. 4, <i>Queen's-terrace, Queen's-gate, Kensington Gore, W.</i>
1849	*Laffan, Capt. Robert Michael, R.E. <i>Army and Navy Club, S.W.; and Otham Lodge, Kent.</i>
1859	Lamb, Lieut. Henry, I.N. 108, <i>Leadenhall-street, E.C.</i>
1861	Lamont, James, Esq. <i>Brooks's Club, S.W.</i>
1838	*Lance, John Henry, Esq., F.R.S. <i>The Holmwood, Dorking.</i>
1861	Lane, Edward, Esq. <i>Peninsular and Oriental S. N. Company, 122, Leadenhall-street, E.C.</i>
1861	*Lang, Andrew, Esq. <i>Dunmore, Hunter River, N. S. Wales; and 46, Queen Anne-street, W.</i>
1859	860* Lange, Daniel A., Esq. 21, <i>Regent-street, S.W.</i>
1856	Langler, J. R., Esq., Lecturer, Wesleyan Normal Institution. <i>Westminster, S.W.</i>
1856	Lansdowne, Henry, Marquis of, K.G., D.C.L., F.R.S. <i>Lansdowne-house, Berkeley-square, W.; Richmond-hill, Surrey, S.W.; and Boxwood-park, Wilts.</i>
1833	*Larcom, Maj.-General Sir Thomas Aiskew, R.E., E.C.N., F.R.S. <i>Castle, Dublin.</i>
1861	Lardner, Col. John. <i>Junice United Service Club, S.W.</i>
1859	Larnach, Donald, Esq. 21, <i>Kensington Palace Gardens, W.</i>
1852	Latham, Robert Gordon, Esq., M.D., F.R.S., &c. <i>Greenford-house, Hanwell, Middlesex, W.</i>
1854	Latrobe, Ch. J., Esq. <i>Athenaeon Club, S.W.; and Whitbourne Court, Worcester.</i>
1854	Laure, Walter, Esq. 2, <i>Princes-street, Mansion-house, E.C.</i>
1846	*Law, the Hon. H. Spencer, M.A., I., <i>Lowder-st., S.W.; and Ellington-h., Ramsgate.</i>
1830	870 Law, William J., Esq. 63, <i>Upper Seymour-street, W.; 33, Lincoln's-inn-fields, W.C.; and 5, Sussex-square, Brighton.</i>
1861	Lawrence, Edward, Esq. 16, <i>Wellesley-terrace, Prince's-park, Liverpool.</i>
1851	Lawrence, Edward B., Esq. 20, <i>King-street, Portman-square, W.</i>
1857	Layard, Austen H., Esq., M.P., D.C.L. 130, <i>Piccadilly, W.</i>
1860	Leader, Nicholas P., Esq., M.P. <i>Conservee Club, S.W.; and Dromagh, Cork.</i>
1861	*Learmouth, Dr. John. <i>Ryde, Isle of Wight.</i>
1853	*Le Breton, Francis, Esq. 21, <i>Sussex-place, Regent's-park, N.W.</i>
1861	Leckie, Patrick C., Esq. 7, <i>Palace-road, Roupell-park, Streatham, S.</i>
1858	Lee, Charles, Esq. 41, <i>Grosvenor-place, S.W.</i>
1857	Lee, George, Esq. <i>Frogmore, Rohais, Guernsey.</i>
1830	880* Lee, John, Esq., LL.D., D.C.L., F.R.S., F.S.A., F.R.S.N.A., &c. 5, <i>College, Doctors'-commons E.C.; and Hartwell-house, near Aylesbury, Bucks.</i>
1839	Lee, Thomas, Esq. <i>Great Barr, Staffordshire.</i>
1861	Lefevre, George Shaw, Esq. 8, <i>Spring-gardens, S.W.</i>
1833	*Lefevre, Sir John George Shaw, M.A., D.C.L., F.R.S., Vice-Chancellor of the University of London. 8, <i>Spring-gardens, S.W.</i>
1853	Lefroy, Colonel John Henry, R.A., F.R.S., F.R.S.A. <i>Royal Arsenal, Woolwich, S.E.</i>
1861	Leph, Wm. John, Esq., M.P. 37, <i>Louisa-square, S.W.; and Lyme-park, Cheshire.</i>
1861	*Lehmann, Frederick, Esq. 139, <i>Westbourne-terrace, W.</i>
1845	Leigh, John Studdy, Esq. 7, <i>St. Stephen's-terrace, Westbourne-grove, W.</i>

Year of
Election.

- 1836 Lemon, Sir Charles, Bart., F.R.S., &c. *Carclew, near Falmouth, Cornwall.*
- 1837 *Lenox, George Wm., Esq. 34, *Portland-square, W.*; and *Pont-y-Pridd, Glamorganshire.*
- 1839 890 Leslie, Patrick, Esq. *Emmerden-house, Upper Norwood, S.*
- 1839 Leslie, Walter D., Esq. *Arthur's Club, St. James's-street, S.W.*
- 1840 *Letts, Thomas, Esq. 8, *Royal Exchange, E.C.*
- 1837 Lerverson, George B. G., Esq. 19, *Bloomsbury-square, W.C.*
- 1862 Levick, Joseph, Esq. 21, *Cleveland-gardens, W.*
- 1859 Levasohn, Louis, Esq. 7, *Finchbury-square, E.C.*
- 1859 Lewis, Rev. Evan, M.A. *Rothwell, Northamptonshire.*
- 1838 Lewis, Rev. Henry, M.A. *St. Paul's Church-buildings, Chapham-common, S.*
- 1832 Leycester, Commander Edmund M., M.S. Superintendent of Packets and Transports. *Admiralty-office, Liverpool.*
- 1861 Leyland, Luke Swallow, Esq. 7, *Walton-place, Brompton, S.W.*
- 1837 900 Liardet, Capt. Francis, M.S. *Royal Hospital, Greenwich, S.E.*
- 1839 Lichfield, Thomas George, Earl of. *Shugborough, Staffordshire.*
- 1836 Lilford, Thomas Lytleton Powys, Lord. 10, *Grosvenor place, W.*
- 1860 Lindsay, H. Hamilton, Esq. 22, *Berkeley-square, W.*
- 1837 Lindsay, Maj.-Gen. the Hon. J., Gren. Guards, M.P. 20, *Portman-square, W.*
- 1861 Lindsay, W. Lauder, Esq., M.D., F.R.S. Edin. *Pitcullen-house, Perth, N.B.*
- 1853 *Lindsay, Wm. S., Esq., M.P. *Manor House, Shepperton, Middlesex.*
- 1838 Lister, John, Esq., M.D. 6, *Porchester-terrace, Hyde-park, W.*
- 1861 Lloyd, Alexander Ogilvie, 2, *Hare-court, Temple, E.C.*
- 1837 *Lloyd, George A., Esq. 2, *Royal Exchange-buildings, E.C.*
- 1861 910 Lluellyn, Capt. Richard. 20, *Montagu-square, W.C.*
- 1839 Loch, Henry Brougham, Esq. 11, *Brook-street, W.*
- 1861 Loch, John Charles, Esq. 12, *Albemarle-street, W.*; and *Hong Kong.*
- 1837 Loch, William Adam, Esq. 8, *Great George-street, Westminster, S.W.*
- 1838 Lockhart, William, Esq., F.R.C.S. *Park-villa, Granville-park, Bloomsbury, S.E.; and Chisum.*
- 1860 Lockwood, James Alfred. *Huddersfield.*
- 1836 *Logan, Sir William Edmund, F.R.S. *Montreal, Canada.*
- 1835 Login, Sir John Spencer. 5, *The Square, Upper Hyde-park-gardens, W.*
- 1860 Loadesborough, Wm. Henry Forester, Lord. 8, *Carlton-house-terrace, S.W.*
- 1830 Long, George, Esq., M.A. 22, *Buckingham-street, Brighton.*
- 1839 920 *Long, Henry L., Esq. *Travellers' Club, S.W.*; and *Hampton-lodge, Farnham, Surrey.*
- 1837 *Long, W. Beeton, Esq. 4, *Great Cumberland-place, W.*
- 1833 Longden, Morrell D., Esq. 4, *Ennismore-place, Hyde-park, S.W.*
- 1861 Longford, Edward Michael Pakenham, Earl of. 24, *Bruton Street, Berkeley Square, W.*; and *Pakenham Hall, Westmeath.*
- 1847 Longman, Thos., Esq. *Paternoster-row, E.C.*; and 8, *Sussex-sq., Hyde-park, W.*
- 1833 Longman, William, Esq. 36, *Hyde-park-square, W.*
- 1861 Lonsdale, Arthur Pemberton, Esq. 15, *Cockspur-street, S.W.*

Year of
Election

- 1860 Looker, William Robert, Esq. 8, *Park Villas, West Richmond, S. W.*
- 1861 Lorimer, George, Esq. *Westminster Palace Hotel, S. W.*
- 1856 Lovett, Phillips Cosby, Esq. *Liscombe-house, Liscombe, near Leighton Buzzard, Bucks.*
- 1861 930 Low, Robert, Esq. 17, *Woburn-square, W. C.*
- 1858 Lowden, Rev. George Rouse. 12, *Leinster-gdns., Hyde-park, W.; and Uxbridge.*
- 1859 Lowe, Capt. W. Drury. *Myris, Bettws-y-Coed, Llanuwst, North Wales.*
- 1830 Lowry, Joseph Wilson, Esq. 45, *Robert-street, Hampstead-road, N. W.*
- 1860 Loyd, Lieut.-Col. Wm. K. *Oriental Club, W.*
- 1860 Luke, William, Esq., Bengal Civil Service. 93, *Interness-terr., Hyde-park, W.*
- 1862 Lumsden, George, Esq. *Grey-lodge, Torquay.*
- 1860 Lumsden, Rev. Robert Comyn. *Broomhall-park, Sheffield.*
- 1860 Lush, Robert, Esq., Q.C. *Balnoral-house, Avenue-road, Regent's-park, N. W.*
- 1839 *Lyell, Sir Charles, B.A., M.D., F.R.S. 53, *Harley-street, Cavendish-square, W.*
- 1837 940 *Lynch, Capt. H. Blasse, I.N., C.B., F.R.S. *Athenæum Club, S. W.*
- 1861 *Lynch, Thomas Kerr, Esq. 99, *Gloucester-terrace, Hyde-park, W.*
- 1858 Lyne, Francis, Esq. 13, *Bristol-gardens, Maida-hill, W.*
- 1860 Mc Clintock, Capt. Sir Francis Leopold, R.S.
- 1862 McCosh, John, Esq., M.D. 17, *Halfmoon-street, Piccadilly, W.*
- 1830 MacDonnell, John, Esq. 48, *Grove-end-road, St. John's-wood, N. W.*
- 1858 MacDougall, Alex. H., Esq. 44, *Parliament-street, Westminster, S. W.*
- 1861 MacGeorge, Colonel, Bengal Army. 18, *Cleveland-square, W.*
- 1859 McGrath, John C., Esq. *Reform Club, S. W.*
- 1856 Macgregor, Alexander, Esq. *West India Committee Rooms, 37, Wallbrook, E. C.*
- 1853 950 McGregor, Duncan, Esq. *Board of Trade, S. W.; and Athenæum Club, S. W.*
- 1839 Macintosh, Lieut.-General Alex. Fisher, R.N. 7, *Tilney-street, Park-lane, W.*
- 1843 *Macintyre, Patrick, Esq., F.S.A., Off. Assoc. Inst. Act. 8, *Waterloo-place, Pall-mall, S. W.; and 13, Greville-place, Kilburn-priory, W.*
- 1859 Mackay, Rev. Alexander, A.M. *Rhynie, Aberdeenshire.*
- 1860 Mackay, Thomas Miller, Esq. 24, *Leinster-gardens, Baywater, W.*
- 1859 *Mackean, Thos. W. L., Esq. 24, *Oxford-square, Hyde-park, W.*
- 1862 Mackenzie, Colin J., Esq. *Windham Club, S. W.*
- 1843 Mackenzie, Right Hon. Holt, F.R.S. *Athenæum Club, S. W.; and 28, Wimpole-street, W.*
- 1861 Mackenzie, Sir James J. Randall, Bart., of *Soutwell, Rosehaugh, Roxburgh.*
- 1860 *Mackenzie, James T., Esq. 69, *Lombard-street, E. C.*
- 1858 960 McKerrell, Robert, Esq. 45, *Interness-terrace, W.; and Mauritius.*
- 1830 Mackillop, James, Esq., F.R.S. 50, *Grosvenor-square, W.*
- 1851 Mackinnon, Lachlan, Esq. *Reform Club, S. W.*
- 1855 Mackinnon, Wm. Alex., Esq., M.P., F.R.S. 4, *Hyde-park-place, W.*
- 1861 Mackintosh, Alexander Brodie, Esq. *Oriental Club, W.; and Dunoon, Scotland.*
- 1860 Mackirdy, Lt.-Col. Elliot, 69th Regt. *U. S. Club, S. W.; and Tonghoo, Birmah.*
- 1860 Maclean, William Crichton, Esq. 5, *Camperdown-terrace, Great Farnmouth,*

Year of
Election.

- 1859 Maclear, Sir Thomas. *Astronomer Royal, Cape of Good Hope.*
- 1859 MacLeay, George, Esq. *Athenæum Club, S.W.; and Sydney.*
- 1852 M'Leod, J. Lyons, Esq., late Consul for Mozambique.
- 1852 970 M'Leod, Walter, Esq. *Head Master of the Royal Military Asylum, Chelsea, S.W.*
- 1855 Maclure, Andrew, Esq. 37, Wallbrook, E.C.
- 1861 Maclure, John William, Esq. 2, Bond-street, Manchester.
- 1855 *M'Clure, Captain Sir Robert J. Le M., R.N. *H.M.S. 'Esk.'*
- 1860 Macmillan, Alex., Esq. *Chadbridge; and 23, Henrietta-st., Covent-garden, W.C.*
- 1855 Macnab, John, Esq. *Stout's-place, Leith-walk, Edinburgh.*
- 1839 M'Neil, The Right Hon. Sir John, G.C.B. *Granton, near Edinburgh.*
- 1861 McConnell, W. R., Esq. 35, Belford-pl., Russell-sq., W.C.; and Charleville, Belfast.
- 1856 *Macpherson, Duncan, Esq., M.D., Inspector-General of Hospitals. *Madras.*
- 1861 Macpherson, William, Esq. 6, Stanhope-street, Hyde-park-gardens, W.
- 1845 980 Macqueen, James, Esq. 20, Harton-street, Kensington, W.
- 1861 *Magnie, Capt. Rochfort, R.N. *United Service Club, S.W.*
- 1853 Majendie, Ashhurst, Esq., F.R.S. *Athenæum Club, S.W.; 152, Albany-street, Regent's-park, N.W.; and Hedingham-castle, Essex.*
- 1845 *Major, Richard Henry, Esq. *British Museum, W.C.*
- 1858 Malby, John Walter, Esq. 8, Seinton-street, Gray's-inn-road, W.C.
- 1853 *Malby, Thomas, Esq. 2, Park-villas, Seven Sisters-road, Holloway, N.
- 1843 *Malcolm, W. E., Esq. *Burnfoot, Langholme, near Carlisle.*
- 1853 *Mallet, Charles, Esq. *Audit Office, W.C.; and Belmont, Hampstead, N.W.*
- 1836 *Manchester, James Prince Lee, Bishop of, F.R.S., &c. *Athenæum Club, S.W.; and Sedgeley-hall, Manchester.*
- 1830 *Mangles, Capt. James, R.N., F.R.S. *Fairfield, near Exeter.*
- 1860 990 Mann, James Alexander, Esq., M.R.I.A. *Kensington Palace, W.*
- 1856 Manning, Frederick, Esq. *Byron-lodge, Leamington.*
- 1859 Mantell, Wm. Walter, Esq.
- 1859 Marett, Charles, Esq., M.A., Barrister-at-Law. 56, Chancery-lane, W.C.
- 1860 Mariette, Prof. Alphonse, M.A. 33, Blandford-square, W.
- 1830 *Marjoribanks, Edward, Esq. 34, Wimpole-street, W.
- 1854 Markham, Clements Robert, Esq. *India Office, S.W.*
- 1856 *Markham, Edward, Esq. 45, Welbeck-street, Curculius-square, W.
- 1857 Marlborough, George, Duke of. *Blenheim, Woodstock.*
- 1857 *Marsden, Robert C., Esq. 14, Hanover-terrace, Regent's-park, N.W.
- 1857 1000 Marsh, Matthew Henry, Esq., M.P. *Oxford and Cambridge Club, S.W.; and 41, Rutland-gate, S.W.*
- 1854 Marshall, Jas. Garth, Esq. *Headingley, nr. Leeds; and Monk Coniston, Ambleside.*
- 1859 *Marsham, the Hon. Robert. *The Mote, Maidstone, Kent; and Japan.*
- 1857 Marshman, J. C., Esq. 7, Kensington-palace-gardens, W.
- 1857 Martin, Francis P. B., Esq.
- 1859 Martin, Rr.-Admiral Sir H. Byam, K.C.B. 16, Carlton-house-terrace, S.W.
- 1861 *Martin, Henry, Esq. *Westwood Villa, Highbury New-park, N.*
- 1860 *Martin, Richard Biddulph, Esq. 21, Eaton-square, S.W.

Year of Election.	
1849	Martin, R. Montgomery, Esq. 23, Gloucester-street, Campden-hill, Kensington, W.
1862	Martin, Thomas, Esq. 22, Stock Orchard-cillas, Calédonian-rd., Holloway, N.
1830 1010	*Martineau, Joseph, Esq., F.R.S., F.R.S. Athenæum Club, S.W.; Basing-park, Alton, Hunts; and Whitbread's Brewery, E.C.
1845	*Matheson, Sir James, Bart., M.P., F.R.S. 13, Cleveland-row, S.W.; and Achany, Bonar-bridge, Sutherlandshire, &c.
1858	¹ Mathieson, James Ewing, Esq. 77, Lombard-street, E.C.; and 16, Queen's-gardens, Bayswater, W.
1837	*Maughan, Captain P., Indian Navy, F.R.A.S. 37, Melville-street, Edinburgh.
1855	May, Daniel John, Esq., R.N.
1858	Mayer, Joseph, Esq., F.R.S. 68, Lord-street, Liverpool.
1861	Mayers, William S. F., Esq., Interpreter to H.M. Consulate; Cauden.
1862	Mayne, Commr. Richard Charles, R.N. 80, Chester-square, S.W.
1858	Mayo, Capt. John Pole. Army and Navy Club, S.W.
1860	*Meinertzhagen, Daniel, Esq. 10, Moorgate-street, E.C.; and 28, Devonshire-place, Portland-place, W.
1854 1020	Melville, Colonel Sir Peter Melville, Military Secretary to the Bombay Government. 27, Palmeira-square, Brighton.
1838	Melville, Philip, Esq., F.R.A.S. Ethy House, Lostwithiel, Cornwall.
1842	*Merivale, Herman, Esq., Under Sec. of State for India. India Office, Victoria-street, Westminster, S.W.; and 26, Westbourne-terrace, W.
1860	Michell, Thomas, Esq. St. Petersburg.
1848	Middleton, Capt. Sir G. N. Broke, Bart., R.N. H.M.S. 'Hera,' Sheerness; and Broke Hall, Suffolk.
1859	Miland, John, Esq. 4, Mount-street, Berkeley-square, W.
1831	Miles, Pliny, Esq. 43, Great Tower-street, E.C.
1860	Miles, Rev. R. Bingham, Notts.
1861	Miller, George T. The Elms, Upper Tooting, Surrey.
1801	*Miller, Lieut. Henry Matthew, R.N. H.M.S. 'Devonport' and Junior United Service Club, S.W.
1853 1030	*Miller, Captain Thomas, R.N. H.M.S. 'Clío,' and United Service Club, S.W.
1861	Milligan, Joseph, Esq. Athenæum Club, S.W.; and 15, Northumberland-st., W.C.
1857	Mills, Arthur, Esq., M.P. 34, Hyde-park-gardens, W.
1860	Milman, Capt. Everard, Madras Horse Artillery. 9, Berkeley-square, W.
1853	Milnes, Richard Monckton, Esq., M.P. 16, Upper Brook-street, W.; The Hall, Bawtry; and Fryton-hall, Ferribridge, Yorkshire.
1860	Mitchell, Alexander, Esq. 6, Great Stanhope-street, Park-lane, W.
1859	Mitchell, William, Esq. 54, Gracechurch-street, E.C.
1851	*Mocatta, Frederick D., Esq. 35, Gloucester-place, Portman-square, W.
1858	Moffat, Robert, Esq. Gov. Surveyor, Hope Town and Kuruman, Cape of Good Hope.
1853	Moffatt, George, Esq., M.P. 103, Eaton-square, S.W.
1861 1040	Mollison, Alexander Fullerton, Esq. 10, Lansdowne-terrace, Notting-hill, W.
1860	*Molson, Thomas, Esq. 1, Molson-terrace, Montreal, Canada.
1862	*Montague, Capt. Horace. 21, Marlborough-place, St. John's-wood, N.W.

Year of
Election.

- 1842 *Montagu, Major Willoughby. *Clapham-common, S.*
- 1842 *Monteagle, Thomas, Lord, F.R.S. 7, *Park-street, Westminster, S.W.; and Mount Trenchard, Limerick.*
- 1830 *Montefiore, Sir Moses, Bart., F.R.S., F.R.S.N.A. 7, *Greenwich-gate, Park-lane, W.; and East Cliff-lodge, Ramsgate.*
- 1830 *Monteith, Lieut.-General William, E.I.C. Esq., F.R.S. 11, *Upper Wimpole-street, W.; and Oriental Club, W.*
- 1859 Montgomerie, F. Butler, Esq. 2, *Cleveland-row, St. James's, S.W.; and St. Leonard's-on-Sea.*
- 1859 Montgomerie, Capt. T. G., Beng. Engrs., 1st Assist. Trig. Survey. *Dehra Doon.*
- 1840 Montgomery, Robert Martin, Esq. 6, *Ashley-place, Victoria-street, S.W.*
- 1839 1050 Moody, Lieut.-Colonel R. C., R.E. *British Columbia; and Junior United Service Club, S.W.*
- 1861 Moon, Rev. Edward Graham. *Fetcham, Surrey.*
- 1859 Moon, William, Esq. 104, *Queen's-road, Brighton.*
- 1857 *Moor, Rev. Allen P., M.A., F.R.S. Sub-Warden *St. Augustine College, Canterbury.*
- 1857 Moore, Captain John, R.N., C.B. *Admiralty, S.W.*
- 1861 Moore, John Carrick, Esq. *Cornwall, Wiltshire; and 23, Bolton-street, W.*
- 1857 Moore, Major-General W. Y. *United Service Club, S.W.*
- 1861 Morgan, Junius Spencer, Esq. 13, *Prince's-gate, Hyde-park, S.W.*
- 1861 Morgan, William, Esq., R.N. *H.M.S. "Pembroke," Harwich.*
- 1839 *Morris, Charles, Esq. *University Club, S.W.*
- 1861 1060 Morrison, Captain Peter. 3, *Pall Mall, S.W.; and Porchester-square, W.*
- 1861 Mouat, Frederick J., Esq., M.D., Surgeon-Major and Inspector-Genl. of Prisons, Bengal Army, &c. *Athenæum Club, S.W.; and India.*
- 1858 Mudie, Charles Edward, Esq. 13, *Russell-square, W.C.*
- 1858 Mueller, Ferdinand, Esq., M.D., PH. DR. *Director of the Botanical Gardens, Melbourne.*
- 1855 Muir, Thomas, Esq. 24, *York-terrace, Regent's-parc, N.W.*
- 1859 Murchison, Capt. Kenneth R. *Both.*
- 1830 *Murchison, Sir Roderick Impey, G.C.S.R., M.A., D.C.L., V.P.R.S., G.S., and L.R., Director-General of the Geological Survey of Great Britain and Ireland, Trust. Brit. Mus., Hon. Mem. R.S. of Ed., R.I.A., Mem. Acad. St. Petersburg, Berlin, Stockholm, Brussels, and Copenhagen, Corr. Ins. Fr., etc. etc. 16, *Belgrave-square, S.W.; and 28, Jermyn-street, S.W.*
- 1830 *Murdoch, Thomas W. C., Esq. 8, *Park-street, Westminster, S.W.; and Riccardi, Putney, S.W.*
- 1851 Murray, George, Esq.
- 1860 Murray, George J., Esq. *Shrivensham House, Shrivensham, Berks.*
- 1851 1070 *Murray, Capt. the Hon. Henry Anthony, R.N. 4D, *Albany-chambers, W.*
- 1844 *Murray, James, Esq. *Foreign Office, S.W.*
- 1830 Murray, John, Esq. 50, *Albemarle-street, W.; and Newstead, Wimbledon, S.W.*
- 1860 *Murray, Lt. W., 68th Beng. N. Inf., Topo. Assist. G. Trig. Survey. *Munawar, India.*

- 1853 Napier, Col. Geo. Thomas Conolly, C.B., Assist. Adj.-Gen. *Junior U.S. Club, S.W.*
- 1861 Napier, William, Esq. 1, *Blerrington-road, Lee, Blackheath, S.E.*
- 1857 Napier, Hon. William, 54, *Green-street, Grosvenor-square, W.*
- 1857 Nares, Francis, Esq. *Athenæum Club, S.W.*
- 1859 *Nasmyth, Capt. David J., 1st Assist. Trigonometrical Survey. *East India U. S. Club, S.W.*; 5, *Charlotte-square, Edinburgh*; and *Bhaof, Bombay.*
- 1861 Neave, Sir Richard Digby, Bart. *Travellers' Club, S.W.*; 78, *Eccleston-square, S.W.*; and *Dagnam-park, Romford, Essex.*
- 1857 1080 Nelthropp, George, Esq. 20, *Gloucester-street, Belgrave-road, S.W.*
- 1857 *Nesbitt, Henry, Esq. 19, *Pembury-road, Lower Clapton, N.E.*
- 1859 *Newcastle, Henry Pelham-Clinton, Duke of. *Colonial Office, S.W.*; *Clumber-park, Workop Manor*; and *Nottingham Castle, Notts.*
- 1856 Newman, Thomas Holdsworth, Esq. 14, *Arlington-street, S.W.*
- 1856 Nicholson, Sir Charles, Bart., D.C.L., Chancellor of the University, Sydney. 66, *Cornhill, E.C.*
- 1861 Nicholson, Lt.-Col. Lothian, R.E. 26, *Suffolk-street, Pall-mall, S.W.*; and 11, *Janus-street, Buckingham-gate, S.W.*
- 1844 Nicolay, Rev. Chas. Grenfell. *Bahia.*
- 1836 Nicolson, Capt. Sir Frederick Wm. Erskine, Bt., R.N. *Woolwich Dockyard, S.E.*
- 1858 Nix, John H., Esq. 77, *Lombard-street, E.C.*
- 1840 Nixon, Brinsley de Courcy, Esq. *Athenæum Club, S.W.*
- 1857 1090 Noddlall, C. T. A., Commander R.N., Master Attendant at the Royal Clarence Victualling Yard, Gosport.
- 1861 Noel, the Hon. Roden. 11, *Chandos-street, Cavendish-square, W.*; and *Exton-hall, Oakham, Rutlandshire.*
- 1857 *Nolloth, Captain Matthew S., R.N. *United Service Club, S.W.*; and *Peckham, Surrey, S.E.*
- 1860 Norris, Harry, Esq. *Colonial Office, S.W.*; and 4, *Little St. James-street, S.W.*
- 1861 North, Alfred, Esq. *Salcombe-hill House, Sidmouth.*
- 1856 North, Frederic, Esq., M.P. 3, *Victoria-street, Westminster, S.W.*; and *Hastings-lodge, Hastings.*
- 1820 *Northumberland, Algernon, Duke of, Vice-Admiral, K.G., F.R.S., F.S.A., F.R.S.N.A., Pres. R.I. *Northumberland-house, Charing-cross, S.W.*; *Alnwick and Keildon Castles, Northumberland*; *Warrington-park, Cornwall*; *Ston-house, Middlesex, W.*; and *Stamwick-park, Yorkshire.*
- 1862 Notman, Henry Wilkes, Esq. 7, *Great Marlborough-street, W.*
- 1862 Notman, Robert Russell, Esq. 7, *Great Marlborough-street, W.*
- 1862 Nourse, Henry, Esq. *Conservative Club, S.W.*
- 1858 1100 *Oskeley, R. Banner, Esq. *Oswaldkirk-hall, Yorkshire.*
- 1859 Oakley, Rev. Charles E., M.A.
- 1855 O'Byrne, Robert, Esq. 9, *Adelphi-terrace, Strand, W.C.*
- 1856 O'Byrne, W. R., Esq. *Athenæum Club, S.W.*; 9, *Adelphi-terrace, Strand, W.C.*; and *Cranford, Middlessex.*

Year of Election.	
1856	O'Connor, Col. Luke Smyth, C.B., late Governor of the Gambia. <i>U.S. Club, S.W.</i>
1858	Ogilvie, Edward D., Esq. <i>Fulgillar, Clarence River, New South Wales.</i>
1859	Ogle, John W., Esq., M.D. 13, <i>Upper Brook-street, W.</i>
1861	Oldershaw, Capt. Robert Piggott. 74, <i>Warwick-square, Belgrave-road, S.W.</i>
1861	Oliphant-Ferguson, G. H., Esq. <i>Broadfield House, Carlisle.</i>
1855	Oliphant, Laurence, Esq. <i>Athenæum Club, S.W.; and 4, Mount-street, W.</i>
1853	1110 Oliveira, Benjamin, Esq., F.R.S. 8, <i>Upper Hyde-park-street, W.</i>
1845	*Ommahney, Capt. Erasmus, R.N., F.R.A.S. 40, <i>Charing-cross, S.W.; and United Service Club, S.W.</i>
1838	*Ommahney, H. M., Esq. <i>Blackheath, S.E.</i>
1853	Osborn, Sir George R., Bart. <i>Travellers' Club, S.W.; and Chicksand-priory, Beds.</i>
1856	Osborn, Capt. Sherard, R.N., C.B., Officier de Légion d'Honneur, etc. <i>H.M.S. 'Donagel,' Channel Squadron; and Junior United Service Club, S.W.</i>
1861	Osborn, Capt. Willoughby. <i>Cox's Hotel, Jermyn-street, S.W.</i>
1852	Oswell, William Cotton, Esq.
1860	Otter, Charles, Esq. 13, <i>Leinster-gardens, Hyde-park, W.</i>
1855	Otway, Arthur John, Esq. <i>Army and Navy Club, S.W.</i>
1860	*Ouvry-North, the Rev. J. <i>East Acton, Middlesex, W.</i>
1844	1120 Overstone, Samuel, Lord, M.A., M.R.I. 2, <i>Carlton-gardens, S.W.; and Wickham-park, Surrey.</i>
1854	Ozenham, Rev. William, M.A. <i>Harrow, Middlesex, N.W.</i>
1846	*Oxford, Samuel Wilberforce, Bishop of, F.R.S., F.R.A. 26, <i>Pall-mall, S.W.; Ockenden Palace, Wheatley, Oxfordshire; and Lavington, Sussex.</i>
1852	Packman, Fred. W. S., Esq., M.D. 12, <i>Clarges-street, Piccadilly, W.; and Cup-ton-hall, Chesterfield, Derbyshire.</i>
1861	Page, Thomas, Esq., C.B., F.R.S. 2, <i>Middle Scotland-yard, S.W.; and Tower Crèmy, Aubrey-road, Baywater, W.</i>
1860	Page, Arthur, Esq. <i>Cromwell Hall, Shepton Mallet, Somersetshire.</i>
1853	Pakington, Right Hon. Sir John Somerset, Bart., M.P. 41, <i>Eaton-square, S.W.; and Westwood-park, Droitwich, Worcestershire.</i>
1856	Palliser, Captain John. <i>Comrah, Kilnackthomas, Waterford; and National Club, Whitehall-gardens, S.W.</i>
1855	Palmer, Major Edm., R.A. 7, <i>Home-park, Stoke, Devonport.</i>
1862	Palmer, Rev. Jordan, M.A., F.R.A., Chaplain to St. Ann's Royal Society. <i>Streatham, S.</i>
1838	1130 *Palmer, Samuel, Esq.
1851	Palmerston, Henry John, Lord Viscount, M.P., K.G., G.C.B., F.R.S., &c. <i>Canal-bridge-house, Piccadilly, W.; and Broadlands, Romsey, Hants.</i>
1849	*Parish, Commr. John E., R.N. <i>H.M.S. 'Ardent'; and Army and Navy Club, S.W.</i>
1833	*Parish, Sir Woodbine, K.C.B., F.R.S., &c. <i>Quarry-house, St. Leonard's-on-Sea.</i>
1862	Park, Lt.-Colonel A., H.M. Indian Army. 41, <i>Portchester-square, W.</i>

Year of Election.	
1862	Parker, Robert Donne, Esq. <i>Union Club, S.W.; and Barkham, Canterbury.</i>
1850	*Parkyns, Mansfield, Esq., F.Z.S. <i>Arthur's Club, St. James's-street, S.W.; and Woodborough-hall, Southwell.</i>
1854	Parr, Thomas Clements, Esq., M.A. 21, <i>West-mall, Clifton.</i>
1859	Pasteur, Marc Henry, Esq. 58, <i>Mincing-lane, E.C.</i>
1857	Paton, Andrew A., Esq. <i>H.B.M.'s V.-Consul, Missolonghi, Greece; and Douglas and Co., 20, Broad street, E.C.</i>
1858	1145 Paul, Joseph, Esq. <i>Ormonde-house, Ryde, I. of Wight.</i>
1847	*Paynter, William, Esq., F.R.S.S. 21, <i>Delgrave-square, S.W.; and Camborne-house, Richmond, Surrey, S.W.</i>
1855	Peabody, George, Esq. 22, <i>Old Broad-street, E.C.</i>
1853	Pencock, George, Esq. <i>Starcross, near Exeter.</i>
1860	Pearce, Ebenezer John, Esq., PH. DR., <i>Principal of Great Ealing School, Ealing, Middlesex, W.</i>
1853	*Peckover, Alexander, Esq. <i>Wisbeach.</i>
1860	*Peck, Henry William, Esq. <i>Wimbledon-house, S.W.</i>
1861	Peel, Archibald, Esq. 56, <i>Portland-place, W.</i>
1858	Peel, Sir Robert, Bart., M.P. 4, <i>Whitehall-gardens, S.W.; and Drayton Manor, Tamworth.</i>
1846	*Pelly, Sir John Henry, Bart. <i>Upton, Essex.</i>
1830	1150 *Penn, Richard, Esq., F.R.S. 6, <i>Lancaster-place, Richmond, S.W.</i>
1853	Percy, Colonel the Hon. Hugh M. (Guards). 8, <i>Portman-square, W.</i>
1860	Perkins, Frederick, Esq. <i>Mayor of Southampton.</i>
1860	Perowne, Rev. J. J. Stewart, Divinity and Hebrew Lecturer. <i>King's College, W.C.</i>
1859	Perry, Sir Erskine, Member Indian Council. 36, <i>Eaton-place, S.W.</i>
1859	Perry, William, Esq., H.B.M.'s Consul, Panama. <i>Athenaeum Club, S.W.</i>
1857	*Peters, William, Esq. 35, <i>Nicholas-lane, Lombard-street, E.C.</i>
1860	Petherick, John, Esq., H.B.M.'s Consul for the Sudan.
1858	Peto, Sir S. Morton, Bart., M.P. 12, <i>Kensington-park-gardens, W.</i>
1861	Petrie, Alexander S., Esq. 4, <i>St. Mark's-square, E.C.</i>
1860	1160 Petrie, Captain Martin, 14th Regiment. 4, <i>New-street, Spring-gardens, S.W.</i>
1854	Phelps, William, Esq. 18, <i>Montagu-place, Russell-square, W.C.</i>
1862	Phene, John Samuel, Esq. 34, <i>Oakley-street, Chelsea, S.W.</i>
1837	Phillimore, Capt. Augustus, R.N. <i>Shipshale House, Reading; and U. S. Club, S.W.</i>
1859	Phillimore, Chas. Bagot, Esq. <i>India Office, S.W.; and 25, Upper Berkeley-st., W.</i>
1843	Phillimore, John George, Esq., Q.C. 19, <i>Old-buildings, Lincoln's-inn, W.C.</i>
1860	Phillimore, Wm. Brough, Esq., late Capt. Grenadier Guards. 5, <i>John-street, Berkeley-square, W.</i>
1860	Phillip, George, Esq. 32, <i>Fleet street, E.C.</i>
1830	*Phillippe, Sir Thomas, Bart., M.A., F.R.S., F.R.A. <i>Athenaeum Club, S.W.; and Mühle-hill, Broadway, Worcestershire.</i>
1854	Phillips, Major-General Sir B. Travell. <i>United Service Club, S.W.</i>
1856	1170 Phillips, John, Esq., Solicitor. <i>Hastings.</i>
1859	Phinn, Thomas, Esq., Q.C. 50, <i>Poll Mall, S.W.</i>
1861	Pike, Frederick, Esq. 44, <i>Charing-cross, S.W.</i>

Year of Election	
1852	*Pike, Commander John W., R.N. 20, <i>Old Burlington-street, W.</i> ; <i>Junior United Service Club, S.W.</i>
1855	Pilkington, James, Esq., M.P. <i>Reform Club, S.W.</i> ; and <i>Blackburn.</i>
1851	*Pim, Commander Bedford C. T., R.N., <i>Junior United Service Club, S.W.</i>
1858	Pincott, James, Esq. <i>University College, London, W.C.</i> ; and <i>Christchurch road, Roupell-park, Briston-hill, S.</i>
1859	Pinney, Colonel William, M.P. 30, <i>Berkeley-square, W.</i>
1858	Platen, His Excellency Count, Minister Plenipotentiary, Sweden and Norway. 49, <i>Grosvenor-place, S.W.</i>
1860	Playfair, Capt. Robt. Lambert, Madras Artillery. <i>Acting Political Agent, Aden.</i>
1860	Plowden, Charles Hood C., Esq. 15, <i>Fork-street, Portman-square, W.</i>
1856	*Plowes, John Henry, Esq. 39, <i>Fork-terrace, Regent's-park, N.W.</i>
1834	*Pocock, John I., Esq. <i>Puckrup-hall, Tewkesbury.</i>
1835	*Pollexfen, Capt. J. J. <i>India.</i>
1837	*Pollington, John Charles George, Viscount, F.R.S. <i>Messidy-park, near Leeds.</i>
1853	Pollock, Lieut.-General Sir George, G.C.B. <i>Clapham-common, Surrey, S.</i>
1835	*Ponsonby, Hon. Frederick G. B. 3, <i>Mount-street, Grosvenor-square, W.</i>
1860	Pook, Captain John. 5, <i>Alpha-terrace, New Cross-road, S.E.</i>
1857	Pope, Captain Wm. Agnew. 52, <i>Charles-street, Berkeley-square, W.</i>
1853	Porter, Edwd., Esq. <i>Athenæum Club, S.W.</i> ; and 26, <i>Suffolk-st., Pall-mall, S.W.</i>
1830	*Portlock, Maj.-General Joseph E., R.E., F.R.S. <i>War Department, 13, Great George-street, S.W.</i> ; and 58, <i>Queen's-gardens, Hyde-park, W.</i>
1859	Pottinger, Lieut.-Colonel William. <i>Junior United Service Club, S.W.</i>
1861	*Pounden, Captain Lonsdale. <i>Junior United Service Club, S.W.</i> ; and <i>Brownwood, Co. Wexford.</i>
1852	Powell, Lewis, Esq. <i>Port Louis, Mauritius.</i>
1859	Power, E. Rawdon, Esq.
1854	Power, John, Esq. 25, <i>Sussex-place, Regent's-park, N.W.</i> ; and <i>Panama.</i>
1854	Power, John Arthur, Esq., M.A., B.M. 52, <i>Burton-crescent, W.C.</i>
1860	Pratt, Hodgson, Esq.
1853	Price, Jas., Esq., M.D., F.R.C.S., &c. <i>Effra-road, Brixton, Surrey, S.</i>
1852	Price, James Glenie, Esq., Barrister-at-Law. 14, <i>Clement's-lane, W.C.</i>
1859	Price, Capt. R. Havard, 31st Bengal N. Infantry. <i>Bengal.</i>
1860	*Prickett, Rev. Thomas William. <i>University Club, S.W.</i> ; and <i>Hull, Yorkshire.</i>
1855	*Pringle, Thomas Young, Esq. 14, <i>Eaton-square, S.W.</i>
1845	Prinsep, Henry T., Esq. <i>Little Holland-house, Kensington, W.</i>
1859	Pritchard, Wm. Thos., Esq. <i>H.B.M.'s Consul, Fiji.</i>
1861	*Prodgers, Rev. Edwin, jun. <i>The Rectory, Ayott St. Peter's, Herts.</i>
1852	Prout, John William, Esq., M.A., Barrister-at-Law. <i>Athenæum Club, S.W.</i> ; and <i>Naundon, Middlesex, N.W.</i>
1860	Puller, Arthur Giles, Esq. <i>Youngsbury, Ware.</i>
1844	Puller, Christopher W. Giles, Esq., M.P. <i>Athenæum Club, S.W.</i> ; and <i>Youngsbury, Ware, Herts.</i>
1857	Purcell, Edward, Esq., LL.D. 14, <i>Croom's-hill, Greenwich, S.E.</i>
1859	*Purdon, Wm. H., Esq., Executive Engineer, Punjab. 94, <i>Wimpole-street, W.</i>

Year of
Election.

- 1861 Quin, Lord George. 15, *Belgrave-square, S.W.*
- 1834 *Quin, Rear-Admiral Michael. *Senior U.S. Club, S.W.; and 18, Albion-villas, Albion-road, Islington, N.*
- 1858 *Rabstock, Graville Augustus, Lord. 30, *Bryanston-square, W.*
- 1853 Rae, John, Esq., M.D. 4, *Fenchurch-street, E.C.; and Canada.*
- 1859 Rukes, Henry, Esq., M.A. *Llangwin Hall, Mold, Flintshire.*
- 1862 Rurray, George D., Esq. *War Office, S.W.*
- 1851 *Ramsay, Rear-Admiral Wm., C.B., F.R.S.S. *Junior U.S. Club, S.W.; and 23, Anslie-place, Edinburgh.*
- 1859 Ratcliff, Charles, Esq., F.S.A. *National Club, S.W.; Edgbaston, Birmingham; and Downing College, Cambridge.*
- 1861 Rate, L. M., Esq. 21, *Upper Grosvenor-street, W.*
- 1846 1220 Ravenshaw, F. C., Esq., M.B.A.S. *Oriental Club, W.; and 5, Cavendish-square, W.*
- 1859 Ravenstein, Ernest G., Esq. *Topographical Dépôt, Spring-gardens, S.W.*
- 1861 Rawlinson, Sir Christopher. *The Hermitage, Woking.*
- 1844 *Rawlinson, Maj.-General Sir Henry C., K.C.B., D.C.L., F.R.S. *Athenæum Club, S.W.; and 39, Hill-street, Berkeley-square, W.*
- 1838 Rawson, Rawson Wm., Esq., C.B., Colonial Secretary.
- 1857 Reed, William, Esq. *Oak Lodge, Addison-road, Kensington, W.*
- 1861 *Reid, David, Esq. 57, *Jermyn-street, S.W.*
- 1858 Rees, L. E. R., Esq. *India.*
- 1859 Reeve, John, Esq. *Conservative Club, S.W.*
- 1856 Reid, Henry Stewart, Esq. *Bengal Civil Service.*
- 1857 1230 Reid, Lestock R., Esq. *Athenæum Club, S.W.; and 122, Westbourne-ter., W.*
- 1861 Reid, William, Esq., C.E. 27, *Chaloot-villas, Haverstock-hill, N.W.*
- 1861 Reilly, Anthony Adams, Esq. *Belmont, Mullingar.*
- 1830 *Rennie, George, Esq., C.E., F.R.S., Hon. M.B.A.S. 39, *Wilton-crescent, Belgrave-square, S.W.; and Holmwood-lodge, near Dorking, Surrey.*
- 1830 *Rennie, Sir John, C.E., F.R.S., F.S.A. 5a, *Spring-gardens, S.W.*
- 1834 *Rennie, M. B., Esq., C.E. 39, *Wilton-crescent, Belgrave-square, S.W.*
- 1830 *Renouard, Rev. George Cecil, B.D., M.B.A.S. *Swanscombe-rectory, near Dartford.*
- 1830 *Renwick, Lieutenant, R.E.
- 1861 Reuter, Julius, Esq. 2, *Royal Exchange-buildings, C.E.*
- 1858 Reynardson, Henry Birch, Esq. *Adwell, near Tetworth, Oxfordshire.*
- 1861 1240 Ricardo, Darkl, Esq. *Gutcombe-park, Minchinhampton.*
- 1857 Richards, Capt. George H., R.N. *H.M.S. 'Plumper,' Pacific; and Torpoint, Cornwall.*
- 1860 Richards, the Rev. George, D.D. *Streatham, S.*
- 1830 *Richardson, Sir John, B.N., M.D., C.B., F.R.S. *Lancrigg, Grassmere, Westmoreland.*
- 1860 Richardson, Wm., Esq. *Reform Club, S.W.; and Hill-house, Hatfield.*
- 1859 Richards, Edward Henry, Esq. *Drayton House, West Drayton, Middlesex.*
- 1860 Rintoul, Robert, Esq. *Wyndham Club, S.W.*

Year of
Election.

- 1830 *Robe, Col. Fred. Holt, C.B. *U. S. Club, S.W.; and 16, Palace-gardens-terrace, Kensington, W.*
- 1802 Roberts, Arthur, Esq. *Ormond-house, A. Old Kent-road, S.E.*
- 1861 Roberts, Capt. E. Wynne. *Crofton-lodge, near Orpington, Kent.*
- 1860 1250 Robertson, D. Brooke, Esq., H.B.M.'s Consul, Canton.
- 1861 Robertson, Graham Moore, Esq. 21, *Cleveland-square, Hyde-park, W.*
- 1853 Robinson, Albert, Esq., C.E. 35, *Great George-street, Westminster, S.W.*
- 1860 Robinson, Benjamin Coulson, Esq. 8, *King's Bench-walk, Temple, E.C.; and 43, Mark-lanbury-square, W.C.*
- 1830 *Robinson, Captain Charles G., R.N. 16, *Delamere-ter., Upper Westbourne-terrace, W.*
- 1839 Robinson, Capt. D. G. *Staff of the Great Trigonometrical Survey, Rawal Pindé, Punjab.*
- 1859 Robinson, Sir Hercules G. P. *Governor of Hong Kong.*
- 1853 Robinson, Thos. Fleming, Esq., F.R.S. 2, *Horatio-terrace, Ormond-road, Old Kent-road, S.E.*
- 1850 *Robinson, Walter F., Esq., Commander R.N. *Junior United Service Club, S.W.*
- 1856 Roche, Antonio, Esq. *Educational Institute, Cadogan-gardens, Sloane-st., S.W.*
- 1830 1360 *Rodd, James Rennell, Esq. 40, *Wimpole-street, W.*
- 1840 Roe, John Septimus, Esq., Surveyor-General, Western Australia; and Messrs. *Stilwell, Arundel-street, Strand, W.C.*
- 1830 *Roget, Peter M., Esq., M.D., F.R.S. 18, *Upper Bedford-place, Russell-sq., W.C.*
- 1861 Rokeby, Lieut. Langham. *Conserv. Club, S.W.; and R. M. Barracks, Chatham.*
- 1891 Rollo, Lord. 18, *Upper Hyde-park-gardens, W.; and Duncreeff Castle, Moffat, N.H.*
- 1834 *Rose, the Right Hon. Sir George, F.R.S., LL.D. 4, *Hyde-park-gardens, W.; and 25, Southampton-buildings, Chancery-lane, W.C.*
- 1861 Rose, Jas. Anderson, Esq. *Wandsworth, Surrey, S.W.; and 11, Salisbury-st., W.C.*
- 1857 *Rose, Wm. A., Esq., Alderman. 63, *Upper Thames-street, E.C.; and Befons, Crawford.*
- 1857 Ross, John, Esq., M.A. 2, *Brobant-court, Philpot-lane, E.C.*
- 1844 *Russe, William, Earl of, M.A., F.R.S. *Biercastle, Parsonstown, King's County, Ireland.*
- 1862 1270 Roupell, Robert Priolo, Esq., M.A., Q.C. 13, *Park-lane, W.*
- 1832 *Rous, Vice-Admiral the Hon. Henry John. 13, *Berkley-square, W.*
- 1859 Rowden, Rev. G. Croke. *Oak Lawn, Weybridge.*
- 1862 Rowe, Sir Joshua, C.B., late Chief Justice of Jamaica. 10, *Queen Anne-street, Oldendish-square, W.*
- 1856 Rucker, J. Anthony, Esq. *Blackheath, S.E.*
- 1861 *Rumbold, Charles James Augustus, Esq. *Downing College, Cambridge.*
- 1861 Rumbold, Thomas Henry, Esq. 1, *Eccleston-square, S.W.*
- 1860 Rumsley, Major-General Randall, V.P. Council of Military Education. 9, *Eaton-place, S.W.*
- 1858 *Russell, Arthur John Edward, Esq., M.P. 2, *Audley-square, W.*
- 1830 *Russell, Jesse Watts, Esq., D.C.L., F.R.S. *Ham-hall, Staffordshire.*

List of Fellows of the

Year of Election	
1830	1180 Russell, John, Esq., F.R.S. 37, <i>Chesham-place, S.W.</i> ; <i>Pembroke-lodge, Richmond, S.W.</i> ; <i>Andaleigh-ho., Devon</i> ; and <i>Gart-ho., near Cullendar, N.B.</i>
1830	Russell, Wm. Howard, Esq., LL.D. 18, <i>Summer-place, Onslow-square, S.W.</i>
1860	Rutherford, John, Esq. 2, <i>Crescendish-place, Crescendish-square, W.</i>
1857	*Ryder, Capt. Alfred P., R.N. <i>U. S. Club, S.W.</i> ; and <i>Launde Abbey, Uppingham.</i>
1858	Ryder, John Northcote, Esq. <i>Messrs. Penn and Co., Greenwich, S.E.</i>
1852	*Sabine, Major-General Edw., R.A., V.P.R.S., F.R.S.A., &c. &c. 13, <i>Ashley-place, Victoria-street, Westminster, S.W.</i> ; and <i>Woolwich, S.E.</i>
1847	St. Asaph, Thomas Vowler Short, Bishop of, <i>Palace, St. Asaph, North Wales.</i>
1857	St. David's, Connop Thirlwall, Bishop of, <i>Aberystwyth Palace, Carmarthen.</i>
1862	St. John, Spenser, Esq., Chargé d'Affaires, <i>Port-au-Prince, Haiti</i> , 28, <i>Grove-end-road, St. John's Wood, N.W.</i>
1840	St. Leger, Anthony B., Esq. 10, <i>Berkeley-square, W.</i> ; and 22, <i>Baker-street, Portman-square, W.</i>
1857	1190 St. Vincent, Edward, Viscount. <i>Meaford Stone, Staffordshire.</i>
1845	*Salomons, David, Esq., M.P., Alderman, F.R.S.B. 3, <i>Great Cumberland-place, Hyde-park, W.</i> ; and <i>Broom-hill, near Tunbridge Wells.</i>
1861	Salting, William Levering, Esq. 13, <i>King's Bench-walk, Temple, E.C.</i>
1861	*Sandbach, Wm. Robertson, Esq. <i>Care of Messrs Tins & Co., Liverpool.</i>
1862	Sanford, Henry Aysford, Esq. 23, <i>Cadogan-place, W.</i> ; and <i>Nynceat-court, Wellington, Somerset.</i>
1860	Sarel, Lt.-Col. H. A., 17th Lancers. <i>Army and Navy Club, S.W.</i> ; and <i>Shanghai.</i>
1860	Sartoris, Alfred, Esq. 64, <i>Rutland-gate, S.W.</i>
1852	Saumarez, Captain Thomas, R.N. <i>Army and Navy Club, S.W.</i> ; and <i>Millhook-house, Jersey.</i>
1838	Scarlett, Lieut.-General the Hon. Sir J. Yorke, K.C.B. <i>Portsmouth.</i>
1861	Schenley, Edward W. H., Esq. 14, <i>Princes-gate, S.W.</i>
1859	1300 Scott, Lord Henry. 37, <i>Belgrave-square, S.W.</i>
1861	Scott, Hercules, Esq. <i>Brotherton, near Montrose, N.B.</i>
1855	Scott, Rear-Admiral James, C.B. <i>United Service Club, S.W.</i>
1846	*Scrivener, J. F. P., Esq. 20, <i>Dryton-street, W.</i> ; and <i>Ramridge-house, near Andover, Hants.</i>
1861	Searight, James, Esq. <i>Bedford-hill, Balham, S.</i>
1830	*Sedgwick, the Rev. A., Woodwardian Lecturer, M.A., F.R.S. <i>Athenaeum Club, S.W.</i> ; and <i>Cambridge.</i>
1858	*Serocold, Charles P., Esq. <i>Brewery, Liquorpond-street, E.C.</i>
1853	Sevin, Charles, Esq. 155, <i>Fenchurch-street, E.C.</i>
1853	Sewell, Henry, Esq. 75, <i>Old Broad-st., E.C.</i> ; and <i>Stamford-hill, N.</i>
1860	Seymour, Edward Adolphus F. St. Maw, Lord. <i>Junior United Service Club, S.W.</i>
1858	1310 Seymour, George, Esq. 17, <i>Gracechurch-street, E.C.</i> ; and <i>Streatham S.</i>
1855	Seymour, Admiral Sir Geo. F., K.C.B., G.C.H. 115, <i>Eaton-square S.W.</i>
1853	*Seymour, Henry Danby, Esq., M.P. 39, <i>Upper Grosvenor-street W.</i> ; <i>Knole-Hindon, Wilts</i> ; and <i>Glastonbury, Somersetshire.</i>

- 1854 *Shadwell, Captain Charles F. A., R.N., C.B. Messrs. Woodhead and Co., 44, Charing-cross; and H.M.S. 'Aboukir,' Devonport.
- 1860 *Shadwell, Lieut.-Col. Lawrence, C.B. 91, Plymouth-grove, Manchester; and Cox and Co.
- 1861 Shaffer, Col. Taliaferro P., U.S. 62, Moorgate-street, E.C.; 49, Weymouth-street, Portland-place, W.; and Louisville, Kentucky, U.S.
- 1856 *Share, James Masters, Esq., R.N. H.M.S. 'Calcutta,' East Indies; and Front-street, Tynemouth, Northumberland.
- 1861 Sharp, Peter, Esq. Care of Edward B. Bostock, Esq., 16, Lorraine-pl., Holloway, N.
- 1861 *Sharpe, William John, Esq. 1, Victoria-street, Westminster, S.W.; and Norwood, Surrey, S.
- 1861 Shaw, John Ralph, Esq. 45, Clarendon-square, Leamington Spa; and Arrow-park, Birkenhead.
- 1858 1320 Shea, John, Esq., M.D., Surgeon R.N. 84, Blackfriars-road, S.
- 1846 Sheffield, George A. F. C., Earl of. 20, Portland-place, W.; and Sheffield-park, Sussex.
- 1857 Shell, Major-Gen. Sir Justin, K.C.B. 13, Eaton-place, Belgrave-square, S.W.
- 1857 Shelburne, Henry, Earl of. Lansdowne House, Berkeley-square, W.
- 1861 Shepherd, Rev. Edward John, M.A. Trottercliffe, Kent.
- 1860 Sherer, John, Esq. Manston-cott., Eden-grove, Cornwell-place, Holloway, N.
- 1860 Shekhan, H. Brinsley, Esq., M.P. Bellefield-house, Parson's-green, Fulham, S.W.
- 1857 *Sherrin, Joseph Samuel, Esq., LL.D., FR. DR. Leyton-house, Leyton-crescent, Kentish-town, N.W.
- 1859 Sherwill, Major W. S., F.R.S. Prof. of Surveying, Civil Engr. College, Calcutta.
- 1858 *Shipley, Conway M., Esq. Army and Navy Club, S.W.; and Raheny, Dublin.
- 1862 1330 Showers, Major Charles S. Cox's Hotel, Jermyn-street, S.W.
- 1856 Shuttleworth, Sir J. P. Kay, Bart. 38, Gloucester-square, W.; and Gawthorpe-hall, Burnley, Lancashire.
- 1839 Silver, the Rev. Fred., M.A., F.R.S. Norton Rectory, Market Drayton, Salop.
- 1859 *Silver, Stephen Wm., Esq. 68, Cornhill, E.C.; and Norwood Lodge, Looe, Norwood, S.
- 1853 Silver, William, Esq., M.A., Barrister-at-Law. Addison-road, Kensington, W.
- 1859 Sim, Captain Charles, R.E., Surveyor-General, Ceylon.
- 1860 Sim, John Coyagame, Esq. 39, Old Broad-street, E.C.
- 1853 Simmons, Edward R., Esq., Barrister-at-Law. 13a, North Audley-street, W.
- 1848 Simmons, Colonel John L. A., R.E., C.B. H. B. M.'s Consul, Warsaw; Junior United Service Club, S.W.
- 1853 Simpkinson, Lieut. Francis G., R.N. 55, Victoria-street, Westminster, S.W.
- 1861 1340 Simpson, Frederick, Esq. 23, Duckland-crescent, St. John's-wood, N.W.
- 1861 Simpson, James, Esq., C.E., F.R.S. 29, Great George-street, Westminster, S.W.
- 1857 Sitwell, Major W. H. Junior United Service Club, S.W.
- 1858 Skelmersdale, Edward, Lord. Lutton-park, Ormakirk, Lancashire.
- 1861 Sladen, Rev. Edward Henry Mainwaring. Alton, near Marlborough, Wilts.
- 1861 Sligo, G. J. Browne, Marquis of. 14, Mansfield-st., W.; and Westport, Co. Mayo.
- 1860 *Smith, Augustus Henry, Esq. Bron Ceru, Carnarvon, North Wales.

Year of Election	
1855	Smith, Rev. Browarigg, M.A. <i>Shepherd-lane, Briston, S.</i>
1859	Smith, Edward, Esq. <i>Dublin Castle.</i>
1836	*Smith, Edward Osborne, Esq., F.R.S., &c. 21, <i>Cornwall-terrace, Regent's-park, N.W.</i>
1853	1350 Smith, George, Esq. <i>Peru.</i>
*1857	Smith, George R., Esq. 73, <i>Eaton-square, S.W.</i> ; and <i>Telsden-park, Surrey.</i>
1861	Smith, H. S. Daxley, Esq., M.A. <i>United University Club, S.W.</i>
1860	Smith, Henry W. Seymour, Esq. <i>Sheen-mount, East Sheen, Surrey.</i>
1857	*Smith, Horace, Esq. <i>Braxbourne Borough, Hoddenham.</i>
1830	*Smith, James, Esq., F.R.S.L. & E. <i>Athenaeum Club, S.W.</i> ; & <i>Jordan-hill, Glasgow.</i>
1861	Smith, Jervoise, Esq. 47, <i>Belgrave-square, S.W.</i>
1854	Smith, John, Esq., Memb. Geograph. Soc. Bombay. 7, <i>Mincing-lane, E.C.</i>
1853	Smith, John Harrison, Esq. 49, <i>Inverness-terrace, W.</i>
1853	Smith, John Henry, Esq. 16, <i>Paul Mall, S.W.</i> ; and <i>Purley, Croydon, Surrey.</i>
1861	1360 Smith, J. Sidney, Esq., Barrister-at-Law. 1, <i>Stone-buildings, Lincoln's-inn, W.C.</i>
1861	*Smith, Joseph Travers. 25, <i>Throgmorton-street, E.C.</i>
1838	*Smith, Octavius Henry, Esq. <i>Thames-bank, Westminster, S.W.</i>
1857	Smith, Captain Phillip, Grenadier Guards. 39, <i>Berkeley-square, W.</i>
1839	Smith, Rev. R. Carter. <i>Charlton Rectory, S.E.</i>
1841	*Smith, Thomas, Esq.
1860	Smith, William, Esq., C.E. 19, <i>Salisbury-street, Strand, W.C.</i>
1859	*Smith, W. Castle, Esq. 1, <i>Gloucester-terrace, Regent's-park, N.W.</i>
1857	Smith, Wm. Gregory, Esq. <i>Hudson Bay Company, Finchurch-street, E.C.</i>
1859	Smith, William Henry, Esq. 1, <i>Hyde-park-street, W.</i>
1837	1370 *Smyth, Captain William, R.N. <i>Richmond-house, Ryde, Isle of Wight.</i>
1830	*Smyth, Vice-Admiral William Henry, E.S.P., D.C.L., F.R.S., V.P.S.A., F.R.A.S., Hon. M.R.I.A., Corr. Inst. Fr., &c. &c. <i>Athenaeum Club, S.W.</i> ; and <i>St. John's-lodge, near Aylesbury, Bucks.</i>
1850	*Smythe, Colonel William J., R.A. <i>Fiji Islands.</i>
1839	*Somers, Charles, Earl. 33, <i>Prince's-gate, S.W.</i> ; <i>Eastnor-castle, Hereford-shire</i> ; and <i>The Priory, Reigate, Surrey.</i>
1858	*Somes, Joseph, Esq., M.P. <i>Fortismere, Muswell-hill, N.</i>
1855	Sopwith, Thomas, Esq., M.A., C.E., F.R.S. 43, <i>Cleveland-sq., Hyde-park, W.</i> ; and <i>Allenheads, Haydon-bridge, Newcastle-on-Tyne.</i>
1845	*Sotheby, Lt.-Col. Fred. S., C.B., F.R.A.S. 3, <i>Portugal-street, Grosvenor-sq., W.</i>
1861	South, John Flint, Esq. <i>St. Thomas' Hospital, S.E.</i> ; and <i>Blackheath-park, S.E.</i>
1860	Southesk, James Carnegie, Earl of. <i>Kinnaird Castle, Brechin, N.B.</i>
1853	Southey, Henry Sedgfield, Esq., Barrister-at-Law. <i>Athenaeum Club, S.W.</i>
1860	1380 *Southey, Jas. Lowther, Esq. <i>Leetcroft, Hurstpierpoint, Sussex.</i>
1857	*Speke, Capt. John Hanning. <i>Jordana, Ilminster, Somerset.</i>
1861	Spofforth, Markham, Esq. 3, <i>Perchester-terrace, W.</i>
1830	*Spottiswoode, A., Esq. 12, <i>James-street, Buckingham-gate, S.W.</i>
1855	*Spottiswoode, William, Esq., F.R.S. 19, <i>Chester-street, Belgrave-square, S.W.</i>
1850	*Spratt, Capt. Thos. A. B., R.N., C.B. <i>H. M. S. 'Medina,' Mediterranean.</i>

Year of
Election.

- 1857 Spring-Rice, Hon. S. E. (Deputy-Chairman of the Board of Customs). *Mount
Trenchard, Foynes, Ireland.*
- 1859 Stafford, Edward W., Esq. *Colonial Secretary of New Zealand.*
- 1853 Stanford, Edward, Esq. 6, *Charing-cross, S. W.*
- 1855 Stanhope, Philip Henry, Earl, Pres. Soc. of Antiquaries. 3, *Grosvenor-place-
Ansona, Grosvenor-place, S. W.; and Chesham, Seven Oaks, Kent.*
- 1860 1390* Stanhope, Walter Spencer, Esq. *Cannon-hall, Barnsley, Yorkshire.*
- 1856 Staniland, William, Esq., C.E. *The Crescent, Selby, Yorkshire.*
- 1856 Stanley, Edmund Hill, Esq. *Craven Hotel, Strand, W. C.*
- 1853 *Stanley, Edward Henry, Lord, M.P., D.C.L. 23, *St. James's-square, S. W.*
- 1856 Statham, John Lee, Esq. *Overendish Club, Regent-street, W.*
- 1836 Staveley, Thomas, Esq. *Horwood House, Southborough, Tunbridge Wells.*
- 1858 Staveley, Thos. G., Esq. *Foreign Office; and 24, Cambridge-st., Hyde-park, W.*
- 1850 Steele, Colonel Thomas M., C.B., Coldstream Guards. 36, *Chester-square, S. W.*
- 1830 *Stephen, Sir George. *Melbourne.*
- 1857 Stephensen, Sir R. Macdonald, C.E. 6, *Upper Hyde-park-gardens, W.*
- 1861 1400 Stepney, Col. S. Cowell. 5, *St. George's-place, Hyde-park-corner, W.*
- 1860 Sterling, Col. Sir Anthony. *United Service Club, S. W.; and Cox and Co.*
- 1854 Stevens, Frederic Perkins, Esq. *Melbourne, Australia.*
- 1855 Stevens, Henry, Esq., F.R.S. 2, *Byng-place, Gordon-square, W. C.*
- 1841 Stevenson, Thomas, Esq., F.R.S. 37, *Upper Grosvenor-street, W.*
- 1861 Stewart, Alex. Jas. Robt., Esq. 12, *Belgrave-sq., S. W.; and Ards-house, Donegal.*
- 1860 *Stewart, Major J. H. M. Shaw, Royal Madras Engineers. *Vizagapatam, India.*
- 1860 Stewart, Major Patric, Bengal Engineers.
- 1860 Stirling, Capt. Frederick Henry, R.N. *H. M. S. 'Hero.'*
- 1841 Stirling, Vice-Admiral Sir James. *Senior United Service Club, S. W.*
- 1860 1410* Stirling, William, Esq., M.P. 125, *Park-st., Grosvenor-sq., W.*
- 1860 Stocker, John Palmer, Esq. 93, *Oxford-terrace, Hyde-park, W.*
- 1853 Stoddart, George, Esq. *Kiafann's Castle, Perth, N. B.*
- 1845 *Stokes, Capt. John Lort, R.N. *U. S. Club, S. W.; and Haverfordwest, Wales.*
- 1853 Stopford, Capt. James J., R.N. 4, *Norfolk-avenue, Hyde-park, W.*
- 1858 Stopford, James Sydney, Esq. 18, *Savile-row, W.*
- 1861 Stracey, Sir Henry, Bart., M.P. 39, *Diner-street, Piccadilly, W.*
- 1861 Strunge, Lieut.-Col. Alexander. 17, *Elizabeth-street, Eaton-square, S. W.*
- 1858 Strangford, Percy Ellen, Viscount. 19, *Mansfield-street, W.*
- 1858 Stratford de Redcliffe, Stratford Canning, Viscount. 29, *Grosvenor-square, W.*
- 1860 1420 Stratheden and Campbell, Wm. F. Campbell, Lord. *Stratheden-house, Knights-
bridge, S. W.*
- 1860 Strickland, Edward, Commissary-General. *Barbadoes, W. Indies.*
- 1853 Strutt, George H., Esq., F.R.S. *Brighthelm, Belper.*
- 1858 Strutt, Captain Hammel Ingold. *Examiner Royal Mail Steam Company,
Southampton.*
- 1859 *Strutt, Captain William. *Palace, Kew.*
- 1853 *Strzelecki, Count P. E. de, C.B., F.R.S. 20b, *Savile-row, W.*

Year of Election.	
1859	Stuart, Lieut.-Col. J. F. Dudley Crichton, M.P., Grenadier Guards. 28, <i>Charles-street, St. James's, S.W.</i>
1861	Stuart, Vice-Chancellor Sir John. 11 and 12, <i>Old Buildings, Lincoln's-inn, W.C.</i> ; 5, <i>Queen's-gate, Hyde-park, W.</i> ; and <i>Grushernish, Isle of Skye, Invernesshire.</i>
1834	*Sturge, Thomas, Esq. <i>Northfleet, Kent.</i>
1833	Sturt, Capt. Charles, F.R.S. <i>St. Edmond's, Tirol, Cheltenham.</i>
1857	1430 Sullivan, Captain Bartholomew J., R.N., C.D. <i>Board of Trade, S.W.</i>
1860	Sullivan, John W., Esq. 11, <i>Home-park, Stoke, Devonport.</i>
1861	*Sutherland, George Granville William, the Duke of. <i>Stafford-house, St. James's Palace, S.W.</i>
1856	Sutherland, Kenneth L., Esq., Paymaster R.N., Barrister. <i>Junc. U. S. Club, S.W.</i> <i>Chesterfield-house, Weymouth</i> ; and <i>H.M.S. 'Royal Albert,' Devonport.</i>
1840	*Sutherland, Robert, Esq. <i>Glencoe-house, by Appin, N.B.</i>
1857	Swanzy, Andrew, Esq. 38, <i>Cannon-street, E.C.</i>
1857	*Sweeting, Robert, Esq. 7, <i>Clement's-lane, Lombard-street, E.C.</i> ; and <i>London-hill, Harrow.</i>
1836	*Swinburne, Rear-Admiral Charles H. 18, <i>Grosvenor-place, W.</i> ; and <i>Cupheaton, near Newcastle-upon-Tyne.</i>
1859	Sykes, Christopher, Esq. <i>Stedmere, Malton.</i>
1851	Sykes, Colonel William Henry, M.P., F.R.S., Hon. M.R.I.A. <i>Athenæum Club, S.W.</i> ; and 47, <i>Albion-street, Hyde-park, W.</i>
1852	1440 *Syngs, Major Millington H., R.E. <i>Curragh Camp, Ireland.</i>
1852	Tagart, Courtenay, Esq. <i>Reform Club, S.W.</i> ; and <i>Paris.</i>
1859	Tagart, Francis, Esq. 31, <i>Craven-hill-gardens, Hyde-park, W.</i>
1857	*Tait, Robert, Esq. 14, <i>Queen Anne-street, W.</i>
1861	Talbot, the Hon. Wellington P. Mauners Chetwynd. <i>Honeybourne, Broadway.</i>
1861	Talbot de Malahide, Lord. <i>Malahide Castle, co. Dublin.</i>
1861	Taylor, Joseph Walter, Esq. 2, <i>Milton-grove, Upper Holloway, N.</i>
1861	Taylor, Lieut. A. Dundas, R.N. 14, <i>St. James's-square, S.W.</i>
1856	Taylor, George Cavendish, Esq. <i>Army and Navy Club, S.W.</i>
1854	*Taylor, John Stepford, Esq., M.D. 1, <i>Springfield, St. Anne-street, Liverpool.</i>
1857	1450 Teesdale, John M., Esq.
1860	Templeton, John, Esq. 12, <i>College-terrace, Islington, N.</i>
1861	Templeton, Viscount. 2F, <i>Albany-street, W.</i> ; and <i>Castle Upton, Belfast.</i>
1857	Tennant, Professor James. 149, <i>Strand, W.C.</i>
1860	Tennant, Major J. F., Bengal Eagra. <i>Director of the Observatory, Madras.</i>
1860	*Thatcher, Colonel, R.I.C.
1861	Theobald, James, Esq., M.A. <i>R. T. Yacht Club, Albemarle-street, W.</i> ; and <i>Grays, Essex.</i>
1854	Thomas, Henry Harrington, Esq. <i>Lunadowne-crescent, Bath.</i>
1859	Thompson, Thomas A., Esq. <i>London and County Bank, Cambridge.</i>
1854	Thompson, William C., Esq. 81, <i>Cambridge-terrace, Hyde-park, W.</i> ; and <i>Royal Cork Yacht Club, Queenstown.</i>

Year of
Election.

- 1848 1460*Thomson, J. Turnbull, Esq. *Chief Surveyor, Otago, New Zealand.*
- 1861 Thomson, Ronald Ferguson, 1st Attaché to the Persian Mission. *Mr. J. H. Twigg's, Clifford-inn, Fleet-street, E.C.*
- 1854 *Thomson, Thomas, Esq., M.D. *Calcutta.*
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- 1859 Tindal, Capt. L. Symonds, R.N.
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- 1862 Wing, Lieut. Arthur, R.N.
- 1861 Wingfield, the Hon. Maurice, R.N. 37, *Grosvenor-square, W.*
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- 1859 Wombwell, C. Orby, Esq.
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- 1857 Woodhead, Captain H. J. Plumridge. 44, *Charing-cross, S.W.*
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- 1856 Worthington, J. Hall, Esq. *Alton Hill, Oston, near Birkenhead.*
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- 1861 Wortley, the Hon. J. F. Stuart. 15, *Curzon-street, Mayfair, W.*
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- 1839 *Wyld, James, Esq., M.P. *Charing-cross, W.C.*
- 1858 1620 Wynne, Rt. Hon. John. *Huslewood, Sligo.*
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- 1854 Yeats, John, Esq., LL.D. *Leicester-house, Peckham, S.E.*
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- 1861 Youl, James A., Esq. *Wardah-house, Clapham-park, S.*
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- 1853 1630 Young, Thomas, Esq. 14, *Eaton-square, S.W.*
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VICTORIA	Royal Society.
NEW ZEALAND . . .	Library of the House of Representatives.
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- 1833.—Captain Sir JOHN ROSS, R.N., for discovery in the Arctic Regions of America.
- 1834.—Sir ALEXANDER BURNES, for the navigation of the River Indus, and a journey by Balkh and Bokhara, across Central Asia.
- 1835.—Captain Sir GEORGE BACK, R.N., for the discovery of the Great Fish River, and its navigation to the sea on the Arctic Coast of America.
- 1836.—Captain ROBERT FITZROY, R.N., for the survey of the shores of Patagonia, Chile, and Peru, in South America.
- 1837.—Colonel CHESNEY, R.A., for the general conduct of the "Euphrates Expedition" in 1835-6, and for accessions to the geography of Syria, Mesopotamia, and the Delta of Susiana.
- 1838.—Mr. THOMAS SIMPSON—Founder's Medal—for the discovery and tracing, in 1837 and 1838, of about 300 miles of the Arctic shores of America.
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 Scrope, G. P., Esq., M.P.
 Selwyn, R. C., Esq.
 Shadwell, Capt. C., F.A., R.S., F.R.G.S.
 Shaffner, Col. T. P., F.R.G.S.
 Shaw, Dr. Norton.
 Sherwill, Major, U. S., F.R.G.S.
 Shipley, Conway M. Esq., F.R.G.S.
 Silliman and Dana, Messrs.
 Smyth, Vice-Adm. W. H., F.R.G.S.
 Snow, Capt. W. Parker.
 Spottiswoode, Wm., Esq., F.R.G.S.
 Sprye, Capt. R.
 Squier, E. G., Esq., U. S.
 Stainton, H. T., Esq.
 Stanford, E., Esq., F.R.G.S.
 Statistical Society.
 Stevens, H., Esq.
 Stockholm, Royal Acad. of Sciences.
 Struve, Prof. O., *Cor.* F.R.G.S.
 Stuart, Mr. J. M'Douall.
 Swart, Chev. J., *Cor.* F.R.G.S.
 Tasmania, Royal Society.
 Tchihatchef, M. Pierre de, *Hon.*
 F.R.G.S.
 Thomassey, M. R.
 Thompson, J. G., Esq.
 Thomson, J. T., F.R.G.S.
 Toronto, Canadian Institute.
 Trade, Board of.
 Tronson, J. M., Esq., Surgeon R.N.,
 F.R.G.S.
 United Service Institution.
 United States, Secretary of Treasury.
 Victoria, Philosophical Institute of.
 Vienna, Imperial Acad. of Sciences.
 ——— Geographical Society.
 ——— Geological Institute.
 Wallich, Dr. C. M.
 Washington, Secretary of War.
 ———, Smithsonian Institution.
 Weekly Dispatch, Editors of the.
 Weller, E., Esq., F.R.G.S.
 West, A., Esq.
 Worcester, Prof. J. E., *Cor.* F.R.G.S.
 Zeithammer, M., A. O.
 Ziegler, Prof. J. M., *Cor.* F.R.G.S.
 Zoological Society.

INSTRUMENTS SUPPLIED TO TRAVELLERS.

To the late MR. I. DUNCAN, Vice-Consul at Whydah, in 1840—

Telescope.
Two Compasses.
Aneroid Barometer.

DR. P. C. SUTHERLAND, M.D., F.R.C.S., at Natal—

Brass Sextant (7½-inch), with Silver Arc, by Troughton and Simms.
Strong-framed Artificial Horizon, by Troughton and Simms.
Two Barometers (Mountain), with Improved Iron Cistern, by Newman.

The late DR. E. J. IRVING, M.D., F.R.C.S., at Abeokuta—

Pocket Chronometer, by Barrand and Lund.
Barometer (Mountain), by Troughton and Simms.

DR. D. LIVINGSTONE, M.D., F.R.C.S., Zambesi, Eastern Africa—

Sykes's Hypsometrical Apparatus, No. 1, with Sling Case, by Casella.
Halleur's " " No. 2 " "
Standard Thermometers, 0 to 212, in Brass Cases. " "
" " in Maroon Cases. " "
Artificial Horizon, with Sling Case. " "
Prismatic Azimuth Compass, silver ring, with leather Sling Case. "

DR. J. RAY, M.D., F.R.C.S., Canada—

Compass, Prismatic Azimuth, by Elliot.
Hypsometrical Apparatus and Lantern, by Casella.
" three W. B. Thermometers, by Casella.
Horizon, Artificial, Circular, by Cary.
Sextant, 24-inch radius, by Cary.

CONRAD J. PETHERICK, F.R.C.S., Khartoum—

Compass, Prismatic Azimuth, by Troughton and Simms.
Chronometer, Pocket, No. 5150, by Barrand and Lund.
Horizon, Artificial, folding-rod, by Troughton and Simms.
Hypsometrical Apparatus, complete, by Casella.
" three Boiling-water Thermometers, by Casella.
" four W. B. Thermometers, by Casella.
Instruments, Drawing, pocket-set (Napier's), by Cary.
" " large set, by Cary.
Protractor, 4-in., Ivory, by Cary.
Rulers, Parallel, 12-in., Ivory edges, by Cary.
Sextant, 6-in., Platina Arc and Gold Vernier, &c., by Cary.
" 6-in., Silver Arc, Ordnance pattern, by Casella.
Telescope, Achromatic, 3 feet 4 inches, by Troughton and Simms.
Telescope, Binocular, complete with Case and Sling, by Cary.
Tripod Stand, adapted to Telescope, Sextant, &c., by Cary.

Books—

Raper's Navigation.
Nautical Almanacks, 1861-2.
Blank Forms for Registering and Computation.
Quicksilver in Iron Bottle, 5 lbs.

PRESENTATION
OF THE
ROYAL AWARDS

TO CAPTAIN SPEKE, THE DISCOVERER OF LAKE NYANZA; AND
MR. MACDOUALL STUART, THE EXPLORER OF CENTRAL
AUSTRALIA.

At a previous anniversary it was made known by the Council that in awarding one of our Gold Medals to Captain Burton for his various adventurous explorations, we also fully recognised the high merits of his coadjutor Captain Speke, not only for his geographical labours in laying down their joint map, but also for his independent discovery of the Lake Nyanza Victoria. Had not the Council then desired to divide its honours between the leaders of discoveries in Africa on the one hand, and in North America on the other, there can be no doubt that Burton and Speke would have been simultaneously honoured.

As it is, however, we now have it in our power to give to Captain Speke precisely the same honour which was conferred last year on Captain Burton. Our satisfaction in doing this is increased by knowing that the man we now honour is at this moment employed by the Royal Geographical Society, assisted by Her Majesty's Government, in one of the most arduous enterprizes which was ever contemplated. For if Captain Speke, with his gallant associate Captain Grant, should succeed in defining the whole of the Lake Nyanza, and should be able so to pass northwards as to join Consul Petherick on that southernmost portion of the White Nile, up to which boats and canoes can transport provisions from the north, then truly he will have laid open a vast portion of the interior of Africa hitherto entirely unknown. Whether, indeed, he may be able to determine (even with the aid of the bold and successful Petherick) what may be truly the remotest source of the White Nile, is very problematical. For the Lake Victoria Nyanza, along the banks of which he will proceed, must doubtless be fed by affluents, some of the most powerful of which may descend from the lofty chain of Kenia and Doengo-Engai on the east, and others from the so-called Mountains of the Moon on the south-west.

In this point of view, many a year may elapse before the geographer will be able to trace to its spring-head the largest of these countless affluents. But looking to the White Nile as a gigantic stream which flows directly from south to north, and is subtended and barred in by flanking chains, it will be a sufficient triumph for this our expedition, if Speke can but prove to us, as he has indeed suggested, that his Lake Nyanza Victoria does so range from south to north as to be in direct communication with, and in the same meridian as the Upper White Nile, into which it is supposed the stream descends by cataracts from the water-parting near the Equator, through the Nyanza Victoria.

If Captain Speke should work out this important feature of the mission we have confided to him, he will assuredly reap a scientific glory from his exploits at the sources of the Nile, and thus be entitled to share the honour of the anagram applied to the illustrious Nelson after his victory at the mouth of that classic stream,—

“Honor est a Nilo!”

Sir Roderick Murchison then addressed Earl de Grey in these words :—

“MY LORD,—I have naturally great pleasure in requesting your Lordship, who sat in this chair so recently, and who now occupy so distinguished a post in the government of India, to receive this our Founder's Medal for Captain Speke, a gallant officer of the Indian army.

“As you are quite familiar with the merits of Captain Speke, and are acquainted with the undaunted zeal with which he and his brother officer, Captain Grant, also of the Indian Service, are now endeavouring to trace the sources of the Nile, your approval of their labours will assuredly be most grateful to the feelings of these explorers and their relatives at home.

“I will not ask you to transmit this medal to Captain Speke; for although an Anglo-Indian army did once pass through Lower Egypt, I apprehend that, even the colossal power of the Administration of which you form a part, might fail in catching our Medalist on his way to his lake Nyanza Victoria; but I request you to convey to the parents of the absent traveller this token of our good will and regard for what he has already accomplished, with the expression of our earnest hope that he may be entirely successful in his present noble endeavour.”

Earl de Grey replied by expressing the very great pleasure he experienced in accepting, on behalf of Captain Speke, that symbol of the high estimation in which the Royal Geographical Society held the services he had rendered, and was still rendering, to geo-

graphical science. He cordially and entirely concurred in the course which the Society had taken in awarding that medal to Captain Speke. As President of the Society last year, he had the gratification of presenting a similar medal to Captain Burton, also an officer in the Indian army; and connected as he (Earl de Grey) now was with the Indian office, it was a source of pleasure to him to think that officers of the old Indian army were amalgamating with the rest of the service without yielding any portion of the honourable heritage which, as travellers and geographers, seemed to be pre-eminently their own.

The Chairman then continued: The Patron's Medal has been adjudicated, as you have just heard, to Mr. MacDouall Stuart, for his great and successful explorations in the interior of Australia. When we reflect upon the many endeavours which have been made to traverse the interior of this vast continent, and the partial successes only which have attended the efforts of the most justly distinguished of those explorers, we must at once admit that never was our Gold Medal more worthily bestowed than on this occasion. Of all the precursors of Stuart, the champion in this field of toil and adventure has been Sturt; for even in the year 1837 that distinguished topographer, proceeding from the south to the north-west, reached s. lat. $24^{\circ} 30'$, e. long. $137^{\circ} 59'$. Then it was that, when arrested by arid, saline wastes, in which no drop of fresh water could be detected, Sturt taught one of his subordinates, whilst braving such difficulties, and during such perilous and exhausting journeys, to lay down the precise geographical position of every mountain, valley, or river, and to mark the exact width of every desert tract of "scrub" that separates those oases from each other which are fertilized by fresh-water springs.

As the surveying officer thus instructed was our Medallist of this day, who has now surpassed his old chief (by reaching s. lat. $18^{\circ} 46'$ and e. long. $135^{\circ} 52'$, or 447 English miles farther to the north-west), let us, in honouring the last prizeman, never cease to recollect that, unless there had been a Sturt, to whom we formerly also gave our medal, there might not for many a day have arisen a MacDonall Stuart! It is thus that the value of our honours is recognised, and that, acting up to the motto "*Præmiando incitat*," we increase and score up the new triumphs of advancing knowledge.

From his previous surveys, then, our Medallist had satisfied himself that in the easterly meridian on which Sturt had endeavoured to proceed from the south, all his efforts would be fruitless. We know not

if he had then formed the opinion, that to the west of his former exploration there existed a great depression, which, extending northwards from Lake Torrens, constituted a saline band of some breadth; but we do know that his last discoveries have proved the existence of such an interior depression. Well aware, from the previous labours of Eyre, that the south-western coast-lands constituted an intensely saline region, and, from the actual efforts of Babbage, Warburton, and others, that the environs of Lake Torrens were also intensely saline, the lightly-equipped Stuart darted off to the north-west, and there discovered that fine range of well-watered hills which were alluded to at our last Anniversary. Subsequently indeed he demonstrated—what has not been dwelt upon except at a recent evening meeting—that the rivers proceeding from those hills of small elevation flow into the north and south depression above alluded to, and, becoming saline near their mouths, terminate in an extensive salt-water lake. With our present knowledge, therefore, we may infer that Stuart has fixed the western boundary of a low saline desert, on the eastern shores of which Sturt was arrested. Whether this desert may or not be found to extend much farther to the north, or whether it may be connected with the saliferous sandy tracts reached by Gregory in his efforts to penetrate southwards from the tropical region of northern Victoria, can alone be determined by future explorers. As far as exploration has gone there are strong grounds for believing, with Colonel Gawler, that a vast region of interior lands to the west and north-west will at some future day be occupied by our colonists.

In the mean time what a noble and successful effort has not MacDouall Stuart made to reach the northern coast—for he was within 245 English miles of the Gulf of Carpentaria—and how sincerely have we to thank him for having laid down his devious path so accurately on a map! No one, however, who has not completely read his diary can duly form an idea of the difficulties Stuart had to contend with, and of the invincible fortitude, talent, and sagacity with which he traversed the numerous intervening breadths of scrub and desert to reach a water-hole. Many of the tracts around these springs will doubtless at no distant period be centres of the sheep and cattle pastures of our colonists. And if some of the largest and best of these tracts should fall to the lot of the individuals who originally furnished MacDouall Stuart with the funds and appliances to make these discoveries, let us say that Messrs. Chambers and Finke are richly deserving of that recompense. These gentlemen must indeed be viewed by us as the persons

without whose energy and well-employed capital we should not now have been recounting one of the most striking geographical exploits of modern times.

Having already penetrated to the water-parting of Central and Northern Australia, or where the rivers flow either north-eastwards to the Gulf of Carpentaria, or north-westwards into Cambridge Gulf, MacDouall Stuart may be said to have all but traversed the entire continent from north to south. His present effort to complete that traverse will, we anticipate, be crowned with entire success; and we trust that he may already have reached that fertile tract at the mouth of the Victoria where Gregory's expedition was so long encamped. We are indeed informed by Mr. Chambers that MacDouall Stuart left Chambers Creek on the 31st January, his party consisting of about 50 horses, with 8 men, and a second in command. He was provisioned for three months, and is to form a depôt at Bonny Creek, and, if possible, to strike the Victoria with a small party.

And here I cannot but regret that the suggestions offered by myself, in more than one Anniversary Discourse addressed to this Society, have not hitherto been followed up by any endeavours to form settlements on the north coast of Australia, wherein our fleets might find harbours of refuge, and where, in case of war, our armed forces would occupy a position flanking the whole of that Indian Archipelago in which Britain possesses such rich vested interests. Had we already one such settlement only, and had thus substantially claimed as our own the northern shore of a continent of which we already occupy the other sides, then truly should we have rejoiced in the prospect that, whilst I now address you, our Medallist had reached a haven of repose. But, even as it is, no great gift of seerdom is required to prophesy that the mere passage to the north coast which has been effected by MacDouall Stuart will not only cause the occupation of the intermediate country, but will soon lead to the formation of regular settlements on the northern shores of this great British continent.

The Governor of South Australia, Sir R. McDonnell, has already anticipated the establishment of a telegraphic communication across the continent, and this again will necessitate the occupation of stations on the north coast, by which the colony of Victoria, as well as that of South Australia, will have a much easier and more rapid communication with India than by the circuitous route of the eastern coast and the Torres Straits. And when this telegraphic communication from south to north is opened out across Australia,

may the first message transmitted by it be, "Honour to MacDonall Stuart!"*

Sir Roderick Murchison then addressed the Duke of Newcastle, Her Majesty's Secretary for the Colonies, in these words:—

"My Lord Duke,—As you have heard the reasons assigned for granting the Patron's Medal of this Society to Mr. MacDonall Stuart, and are, of course, well aware of the merits of that explorer, I may say that I am right glad to see your Grace present on this occasion, notwithstanding the great pressure of official business which is, I know, thrown upon you this very day. Your attendance here is, indeed, the most pregnant proof of the lively interest you take in the vast colonies of Australia.

"I am certain, therefore, that in transmitting the Victoria Medal, I hope by this evening's mail, your Grace will much increase the honour by adding to it the sanction of your own approbation.

"The President and Council are already deeply impressed with the conviction that you have on numerous occasions promoted the advancement of geographical science, by the communications you have sent from the Colonial Office, and I now have to thank you for taking this opportunity of testifying to the colonists of Australia, that you rejoice with the geographers of England in recognising the great and important services of Mr. MacDonall Stuart."

The Duke of Newcastle replied that it had afforded him great pleasure to obey the invitation of the President, Lord Ashburton, and attend for the purpose of receiving the medal, for two reasons—first, because he was anxious to testify his entire concurrence in the objects of this important Society, of which he was a humble member, and secondly to express on behalf of the Imperial Government, and more especially of the department over which he had the honour to preside, their entire approval and sympathy in the labours and exertions of that persevering and enterprising explorer to whom that memorial had been awarded. Sir Roderick Murchison had alluded to the former exploits of Captain Sturt, the predecessor of Mr. Stuart in the field of Australian enterprise. He (the Duke of Newcastle) was sure there was no man who would feel less jealousy at the success of Mr. Stuart than that eminent individual. Mr. Stuart commenced his exploration under the auspices of Mr. Chambers, who provided funds for that purpose. He returned in August, 1859, from one of his expeditions, having reason to believe

* The bay at the mouth of the Victoria River is 15° south of the equator, and our countrymen, under Gregory (encampment of Mr. Wilson) were there for eight months, and enjoyed perfect health. If it be objected that Europeans will suffer too severely from the climate to carry on works on the coast of North Australia, it may be suggested, that the chief labourers may be Chinamen or Coolies, to work under English direction.

he should eventually succeed in the object he had in view. Starting again with fresh means and appliances, he ultimately succeeded in reaching a point 100 miles further north than that to which Mr. Gregory had penetrated, when he was stopped by the hostility of the natives. He had travelled a distance of 3000 miles, and undergone great hardships, having, for instance, on one occasion passed 101 hours without water, under a burning sun; and, although he had been driven back by the natives, he might fairly be considered to have accomplished the object he had at heart, which was to strike the north coast somewhere near Cambridge Gulf. It would be out of place at that moment to raise any controversy on such a subject, but as the Chairman had raised the question he must remark that the result of Mr. Stuart's exertions, and the anticipations they held out for the future, convinced him (the Duke of Newcastle) that the Government had for the present done right in not forcing colonization on the northern shores of Australia. He anticipated that those shores would now very soon become peopled, though there might be some difference of opinion as to the best means by which that could be done. The last account of Mr. Stuart was that he was about to start again, and the only circumstance which he (the Duke of Newcastle) regretted in connexion with the expedition, upon which by this time Mr. Stuart must have entered, was that he had gone alone, without scientific companions. But he anticipated that Mr. Stuart would be successful even without those companions, and he should have great pleasure in transmitting the Society's medal to him by the mail which would leave England that day, conscious as he was of the eminent services which that gentleman had rendered to geographical science, and to the colony and his country at large.

Reward for the best Reflecting Instrument.—The Society, last year, recognizing the importance of reflecting instruments to geography, offered a reward of 50*l.* for the best instrument of that description. Representations have, however, been made that sufficient time was not allowed for proper competition: the Council have deferred the award for another season. In the mean time a sextant has been deposited in the Society's office by Messrs. Elliot, which, in addition to other improvements, comprises a stand of great portability.

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 27th May, 1861,

BY SIR RODERICK IMPEY MURCHISON,

VICE-PRESIDENT.

(In the absence of the President, LORD ASHBURTON.*)

GENTLEMEN,

As our respected and noble President, who has truly the interests of our body at heart, has been suddenly compelled to leave London for the north of Scotland, on account of the alarming illness of the noble chieftainess, his lady's mother, whose loss, if it should occur, will grieve many a Highlander besides myself, I am unexpectedly called upon to resume my old place, and act as your President. Under these circumstances you will, I am sure, grant me more than the share of indulgence which you have bestowed upon me on many former occasions.

You will readily comprehend that I could not have prepared the elaborate materials which form the bulk of the Address which lies before me. This address is indeed chiefly made up, as our President would have told you had he been here, from the contributions of the several geographers to whom he appealed; and my duty will be mainly confined to the selection of a few of these materials for reading.

I will, however, add some passages of my own to what I have already read to you on the adjudication of the medals; and these, with a very brief conclusion, constitute all that the short space of

* The President, Lord Ashburton, was suddenly called to the north of Scotland by the alarming illness of the Hon. Mrs. Stewart Mackenzie of Seaforth.

time at my disposal permitted me to accomplish. I regret this the more because I feel certain that if Lord Ashburton had been present he would have efficiently directed your attention to other subjects of practical usefulness and importance, which are intimately connected with the progress of this Society.

OBITUARY.

IN opening this discourse in the usual manner with a sketch of the lives of those Fellows who have been taken from us, I naturally commence with a notice of the most important of the losses we have to deplore, in that of the late George Hamilton Gordon, Earl of ABERDEEN. Born in 1784, and educated at Harrow, he graduated at St. John's College, Cambridge; and already in 1802, being then only eighteen, visited Paris, in company with a young collegian, Mr. Whittington. He there formed the acquaintance of our esteemed and venerable Associate, Mr. Hudson Gurney, with whom, in the subsequent year, he travelled into Italy. From Naples, as Mr. Hudson Gurney informs me, Lord Aberdeen proceeded to Constantinople, Sir W. Drummond being then the British Ambassador at the Porte. Thence he made his celebrated tour in Greece, and, coming home in 1804, was married in 1805. Lord Aberdeen attained to public distinction very early in life, for he had the Order of the Thistle conferred upon him when he was only twenty-four, and was appointed Ambassador to the Emperor of Austria at the age of twenty-nine years.

This is not the place in which the higher qualities and great characteristics of this distinguished statesman can be appropriately recorded. It is not here that we are entitled to trace, as was eloquently done in a powerful daily journal,* all the main features even of his public career. The full treatment of these topics belongs to the historian. Nor are we capable of analyzing the merits of the antiquary, "the travelled Thane, Athenian Aberdeen"—the man whose classic attainments and sound appreciation of the fine arts rendered him for so many years a chosen arbiter in all matters of good taste, whether in architecture or sculpture, and constituted in him an invaluable trustee of the British Museum. But while I am incapable of doing justice to the public services of such a man, I have

* See '*Times*,' 15th Dec., 1859.

fortunately had put into my hands just as I take the chair, the following sketch of Lord Aberdeen's great actions, which I gladly avail myself of, as a truthful and appropriate tribute from our President, Lord Ashburton, who knew him well, and loved him much.

"Lord Aberdeen's first responsible service was the negotiation with Austria, by which he succeeded in detaching that Power from the French Alliance. He was present with the Allies during the whole campaign, from the battle of Dresden to the occupation of Paris; assisted in their councils, and did much to impart union and vigour to their operations. When Lord Castlereagh, by the threat of withholding British subsidies, decided the Allies to march upon Paris, and thereby finish the war; and when, at a later period, to rescue Poland from the grasp of Russia, he broke from the Holy Alliance, and formed a league with France to resist that usurpation by force of arms, Lord Aberdeen acted as his subordinate; and yet Lord Castlereagh was held up to the country as a slave of the Holy Alliance. Lord Aberdeen, his pupil and friend, has been, with like injustice, represented as the submissive tool of Russia and of France. But what were the facts? When, in 1829, Nicholas invaded Turkey, crossed the Balkan, took Varna, and seized on Adrianople, Lord Aberdeen exerted all his influence to induce France and Austria to interpose; and, when they refused, he sent a British squadron to the mouth of the Bosphorus. In 1843 the French Government refused to pay the Pritchard indemnity; the Chambers took part with their Government, but both Government and Chambers yielded to the stern insistence of the British Minister. There was a harmony between Lord Aberdeen's acts and his professions seldom to be found in public men, for his was a mind singularly devoid of guile, prejudices, and vanity; free, in short, from those disturbing influences which too often overbear the principles of ordinary politicians.

"He professed the doctrine of non-intervention, and we find him accordingly opposing restrictions of every kind; restrictions on conscience, restrictions on trade, as well as those minute and vexatious regulations of labour, imposed of old by ignorance, or suggested at present in the name of humanity. In the same spirit he was opposed to any interference in the domestic policy of foreign nations; not from indifference to misgovernment and oppression, but from the absolute conviction that by such interference neither misgovernment nor oppression could be redressed. We find accordingly that Lord Aberdeen discouraged a revolt which he was not

prepared to support; and, as a proof of his political integrity, let me add that he never fostered a popular delusion to gain a party triumph. He resisted the Ecclesiastical Titles Bill, and deplored the cry which it resulted from. He opposed the Russian war; posterity will better judge of that act of his than we can at the present time, who have not yet felt its full consequences.

"Lord Aberdeen was an honest public servant, a far-seeing and consistent statesman, a faithful friend, a delightful companion, exemplary in all the relations of private life; and when, in future times, the mists of prejudice and party spirit shall have passed away, it will then be acknowledged that he was far more liberal, far more consistent and enlightened than many who now profess themselves the exclusive champions of civil and religious liberty."

With a formal exterior, Lord Aberdeen was endowed with a warmth of heart and largeness of views which few but his intimate friends could appreciate. In this assembly it is, indeed, gratifying to have made it known that the oldest of his friends was one of our Fellows, who still survives, and continues to diffuse knowledge and comfort around him. That learned and benevolent man (Hudson Gurney) gives this summary of the character of his early companion, and with whom he continued on terms of intimacy through life:—"I look upon Lord Aberdeen to have been the most perfectly honourable, excellent, and truthful man I ever knew, and who has left the fearful question whether such a one can ever long be Prime Minister of England. No one ever more attached those who came in contact with him. But the degree of his natural constitutional shyness was incredible, and to the last it was most marked how he always, in mixed company, would gather to the people whom he knew, thus diminishing his general popularity."

The highest tribute, indeed, to the memory of Lord Aberdeen is, that our gracious Queen so deeply felt his value as an enlightened, honest, and firm friend, that whilst during his life she gave him the strongest proofs of her friendship, she also honoured his obsequies with especial marks of her affection.

The feature, however, in his truly liberal character which most distinctly connects Lord Aberdeen with this Society is, that he was the Prime Minister who, upon my own representation, perceived the desirableness of granting an annual sum of money to maintain our Society in perpetuity, and thus constituting it the map-office of the nation.

Admitting that no scientific body could have stronger claims upon

the consideration of the Government, most willingly did he approve of the motion of that honest economist, Joseph Hume, at whose instigation the House of Commons voted the grant which first enabled us to meet the difficulties of a rising Society, and which has since been continued to us annually.

I have often dwelt on the good influence exercised upon our prosperity by this grant, obtained under the administration of my illustrious and noble friend, for it was the turning point of the great advance we were destined to make; and, although it be but a small item in the many virtues of a great statesman, it is one which will always endear the name of Aberdeen to every geographer.

George BRAND was born at Arbuthnott, in Aberdeenshire, in 1816. He was educated at King's College, Aberdeen, where he gained several University prizes, and took his degrees as Master of Arts. He commenced his career as a public servant by accepting a civil appointment in Her Majesty's Navy, and serving two years in H.M.S. *Madagascar* on the west coast of Africa, winning for himself the esteem of all with whom he was associated. Mr. Brand entered the service of the Foreign Office in 1844, by being appointed Vice-Consul in the province of Angola by the late Earl of Aberdeen, then Secretary of State for Foreign Affairs. During a residence of nine years at that place, his zeal in the service of his country, the great attention he devoted to the subject of the trade and resources of Angola, and the worthy use he made of his influence and opportunities in suppressing the slave-trade, and promoting the cause of British mercantile interests, elicited high encomiums from the several distinguished statesmen who presided over the department of Foreign Affairs. In 1853, having suffered much from African climate, Mr. Brand was obliged to return to England, where, continuing to devote himself to African subjects, he became the author of various Reports, at the request of Her Majesty's Secretaries of State, including a very able one upon the Decree of the Portuguese Government for Registration and Emancipation of Slaves in the Colonial Possessions of Portugal.

In June 1859, having failed in obtaining an appointment elsewhere, he accepted the Consulate of Lagos in Western Africa, where, having discharged its duties during a brief residence with great judgment and skill, his career was brought to an early close. He died at sea, on board Her Majesty's steamer *Alecto*, having

embarked in that vessel in hopes that change of air might have restored him to health.

As indicative of the kindly nature of our deceased Fellow, we conclude these brief remarks with quoting some lines intended for inscription on a monument, about to be erected over his grave by Mr. Gabriel, H.M. Commissioner at St. Paul de Loande and a few other friends, who were well acquainted with him and deeply mourn his loss:—"Simple and true of heart, of rare intellect and distinguished attainments; an able and conscientious administrator; a faithful friend: he was in life and death a true disciple of his Saviour, in whom alone he trusted."

John Brown, the zealous and unbiassed chronicler of the deeds of our Arctic heroes, who has just passed from us, was one of the earliest members of our Society, having been connected with it since 1837. Born of an old Kentish family, on August 2, 1797, he entered the service of the Hon. East India Company, in which capacity he made several voyages, until a weakness in sight, and other causes, compelled him to leave the sea. A love of geographical research, for which he had always been remarkable, now grew into a passion, and under its influence he became especially drawn towards a subject in which he never afterwards ceased to feel the deepest interest, viz., that of arctic and antarctic discovery. Mr. Brown entered with much ardour into the question of a North-West Passage; and, in later years, the fate of the heroic Franklin and his noble companions became to him subjects of heartfelt interest and earnest inquiry. In many papers published in 1850, he never ceased to urge that the instructions given to Franklin were the only clue by which he might be found, and that the regions hitherto explored had not been in the direction indicated by them. He showed by very just reasoning that, in consonance with these instructions and the ascertained flood-tides and currents of those regions, the missing expedition must be found "between Cape Walker, on the north-east, Bank's Land, to the north-west, Wollaston Land, to the south-west, and Victoria Land, to the south-east;" a deduction since almost literally verified. It was in 1858 that he published his well-known book entitled 'The North-West Passage, and the Plans for the Search for Sir John Franklin.' In 1843 he was among the founders of the Ethnological Society, and in 1847, having communicated some valuable information connected with various Runic monuments found in England to the Royal Society of Northern Antiquaries, Copenhagen, he was elected a

membre-fondateur of that Society. The interest he took in archaeology led him also to become associated with various other Societies connected with antiquarian research.

Dr. Buist was born at Tannadice, Forfarshire, on the 17th November, 1805. At twelve years of age he was sent to St. Salvador's College, St. Andrew's, enrolled as a student, and educated for the Church, to which he was licensed as a preacher in 1826. However, he disliked the profession, and became editor of several newspapers in succession; while at College, he had studied chemistry, anatomy, and natural history, in addition to divinity, with the view of taking a diploma in medicine, as well as his preacher's licence. After an exceedingly active period employed in journalism and in science, he was appointed editor of the 'Bombay Times,' and set sail for India. Under his able management that newspaper has not only attained a first position among journals in India, but has acquired the character of an authority in Europe.

Side by side with the arduous duties bearing on the management of a newspaper in India, Dr. Buist carried on an immense amount of scientific and philanthropic labour. In July 1842, he was placed by Government in charge of the Astronomical, Magnetic, and Meteorological Observatory, Bombay. The appointment was unsalaried, but his duties were so successfully proceeded with, that in the course of three and a half years upwards of three hundred thousand observations had been made, corrected, recorded, and prepared for publication; and Government was pleased on six several occasions to express their approbation of his exertions. On the 4th November, 1845, Sir David Brewster, in moving the thanks of the St. Andrew's Philosophical Society to Dr. Buist, states, "That he had much occasion to correspond with the Observatories in all parts of Europe organized for like purposes with that of Bombay, and that nowhere in England, nowhere on the Continent, had he seen anything like so large an amount of work done as had been carried out by Dr. Buist." In addition to the astronomical department, Dr. Buist organized and introduced an extensive system of tidal and meteorological observations, from Cape Comorin to the Red Sea. Besides these labours immediately bearing upon the Observatory, Dr. Buist volunteered, while in charge of it, to give lectures on natural philosophy, chemistry, and natural history, to the young officers of the Indian navy.

In 1841, on the death of Dr. Heddle, Dr. Buist was appointed

Honorary Secretary to the Bombay branch of the Geographical Society, the 'Transactions' of which contain many valuable papers contributed by him. He originated the publication of ocean-current charts, and worked simultaneously with, though independently of, the well-known Lieutenant Maury, of the American navy, and in the same track of inquiry. He also drew up a valuable chart, showing the earthquake-wave in connexion with severe storms.

Nor are these his only labours; for in the introduction of the art of making and glazing pottery, in the establishment of the trade of printing, and, finally, in the foundation of the meritorious Polytechnic establishment of Bombay, where native workmen are educated, India has been benefited by Dr. Buist. On all occasions when he could benefit the public by the influence of his pen, or personal exertions, he was untiring in his energy, and unwearied in his large-hearted philanthropy; and when it is considered that his varied avocations were carried on independently of the duties appertaining to a newspaper, that in India it is impossible to find intelligent workmen to execute orders, so that detail in any new idea must be worked out by the designer, and that the climate is trying to body and mind, we may well wonder at the vast amount of work accomplished by this indefatigable and energetic man.

In 1859 Dr. Buist was appointed Superintendent of the Government Printing-press, Allahabad, a position in which he might have fairly hoped in a few years to realize a moderate competency, and thus, in some sort, replace the means he had with an over-sanguine and uncalculating philanthropy lavished on the improvement and increase of scientific knowledge, and the general welfare of his fellow men; when his active and useful career was abruptly cut short by an illness, the result of anxiety and over-exertion, which terminated fatally at Calcutta on the 1st October, 1860.

The Hon. Frederick BYRON, M.A., who died suddenly, was the second son of Vice-Admiral Lord Byron, was born in 1822, and educated at Westminster School and Balliol College, Oxford. He was called to the bar in 1848, was appointed Captain of the Sherwood Rifle Rangers, and was also a Deputy-Lieutenant of the county of Essex.

George Godfrey CUNNINGHAM died last autumn, at the age of fifty-eight. He joined the Society at an early period, and was known as the author of a work entitled 'Lives of Eminent Englishmen,' published in his youth. Subsequently he devoted his attention more particularly to geography and topography. 'Bell's

System of Geography, in 6 vols., which went through several editions, and the *Parliamentary Gazetteer of Scotland*, were brought out under his superintendence. Fullerton's *Gazetteer of the World*, in 7 vols., was his principal work; an improved edition of which he was engaged in preparing previously to his decease.

M. Pierre DAUSSY.—Amongst our foreign honorary members whose names death has lately removed from our list, no one has a stronger claim to the record of our esteem, and to the expression of our regret, than M. Pierre Daussy, a member of the Geographical Society of Paris, of which, like Laplace, Cuvier, and Humboldt, he had also been President.

He was born in Paris on the 8th of October, 1792. A hydrographer,—the son of a hydrographer,—he commenced his special studies at an early age, and continued the same pursuits with exemplary perseverance to the close of a long life. As a necessary consequence, he has left the proofs of what may be effected by combined ability and industry. Before he was twenty-one years of age the Institute of France awarded to him Lalande's medal for his calculations of the elements of the orbits of two comets, and the determination of the perturbations of Vesta. His industry and executive mathematical skill gained him the patronage of Beauteemps Beaupré, and caused him to be appointed by the Government to conduct the trigonometrical survey of the coasts of France, when he still wanted three years of obtaining the rank of engineer of the third class. This service led him not merely to observe particular phenomena occurring in certain rivers, such as the Loire and the Garonne, but also the variations in the level of the sea, demonstrating their relation to variations of the barometer. This, his great discovery, was subsequently confirmed by our countryman Sir John Lubbock. Having become attached to the Bureau des Longitudes, and a contributor to the *Connaissance des Temps*, as well as a member of the *Société de Géographie*, he applied himself to the improvement of the tables containing the geographical positions of the principal places on the globe. The important and valuable memoirs which he continued to produce in quick succession are so numerous that the mere detail of their titles would exceed the limits of this sketch. Those given to the Academy of Sciences, of which he was elected member—to the *Société de Géographie*—to the *Annales Maritimes*—to the *Annales Hydrographiques*—and to the *Société Météorologique*, of which he was the founder, amount to

54, besides a considerable number of charts. Whilst thus engaged for the public, he continued his astronomical observations, and kept up an active correspondence with foreign astronomers and geographers.

The distinguished intellectual and scientific attainments of our departed Associate were adorned and commended by their union with the most amiable qualities of the heart, and his intimate friend, M. de la Roquette, concludes an interesting notice of his life and labours with the remark that "he had many friends but not a single enemy."

The Chevalier DE ANGELIS, our corresponding member at Buenos Ayres, and recently deceased there at a very advanced age, was by birth a Neapolitan, and, like many others, exiled from his native land in consequence of his political opinions. In 1825 he accepted an offer of employment from the Government of Buenos Ayres, where he became well known for his political and other writings. Of his publications we may mention, as of especial interest to this Society, 'The Collection of Geographical and Historical Documents and Memoirs relating to the Provinces of the Rio de la Plata and Paraguay,' printed at Buenos Ayres (1836-39), in six folio volumes, an analysis of which will be found in the sixth volume of our Journal, prepared for the Society by Sir Woodbine Parish. It comprises a selection of the most important papers on those subjects existing in the old Spanish archives of that viceroyalty, accompanied by copious explanatory and additional notices by the accomplished editor. In the latter years of his life M. de Angelis was invited to return to Naples, but, preferring to remain in South America, he was appointed Consul-General for his Sicilian Majesty in the provinces of the Rio de la Plata, a reward which he had fairly earned by his long and useful labours in those countries.

The Rev. John William DONALDSON, D.D., the second son of the late Stuart Donaldson, an eminent merchant in the city of London, was born in 1811, and entered Trinity College, Cambridge, in 1830. His distinguished talent soon attracted the attention of the authorities of the College, and was practically displayed in successful competition for the prize annually awarded for a Latin declamation. With this exercise, which, it may be incidentally remarked, received the warm commendation of the present Bishop of St. David's, Dr. Donaldson's long career of literary successes may be considered to have commenced. Shortly after his name appeared in all but the highest place among the competitors for

classical honours; and again, after another short interval, among the Fellows of Trinity. He was soon chosen to take part in the tuition of the College, and, while thus engaged, found time to produce his first, and perhaps most famous, work, the '*New Cratylus*,' which, now in its third edition, deservedly maintains its position as by far the most important contribution to the science of comparative philology that has appeared in this kingdom. About the same time he superintended the compilation of the '*Theatre of the Greeks*,' which, after running through numerous editions, has now appeared freed from all extraneous additions, as the entire work of its former editor.

After a stay of a few years at Cambridge, Dr. Donaldson was appointed to the head-mastership of the public school at Bury St. Edmunds; and there, amidst calls on his time and energies which would have left to most men no power or opportunity to undertake anything beyond their professional duties, he was enabled to give to the world a series of educational works—a complete and valuable edition of Pindar; a fresh and idiomatic translation and commentary on the *Antigone* of Sophocles; some useful works on the Hebrew language; and his now well-known treatise on the Latin language, entitled '*Varronianus*,' which stands as completely at the head of works on Latin as the '*New Cratylus*' does of works on Greek philology. Towards the close of his stay at Bury he published the remarkable volume entitled the '*Book of Jashar*,' which, however it may have provoked comment on other points, has justly been pointed to by all competent to form an opinion as a sample of an easy and felicitous Latinity which has not been equalled in the present century.

In 1855 Dr. Donaldson returned to Cambridge, and, after a brilliant course of lectures on Latin synonyms, which were attended by the best scholars of the place, he steadily devoted himself to the advancement of classical learning. One of his first works after his return was a treatise on Competitive Examinations in reference to Classical Scholarship, which showed such thorough good sense, and such just appreciation of the nature of these forms of examination, that it is only natural to observe that he was soon afterwards appointed one of the classical examiners of the University of London, and subsequently one of the examiners for the civil service. A work on controversial theology, entitled '*Christian Orthodoxy reconciled with the Conclusions of Modern Biblical Learning*,' appeared about the same time, and after but a short interval his

completion of Ottfried Müller's famous '*Literature of Greece*'—a work which Dr. Donaldson had long been selected to finish, and which he now put forth in the three volumes that bear the united names of one of the greatest of the German and one of the greatest of the English scholars of our own times. He next addressed himself again more particularly to the study of language, and gave to the world successively a large and complete grammar of the Greek language, and one nearly as large and equally as complete of the Latin language, and the whole was to have found a fitting sequel in a large lexicon of the Greek language, with every improvement which the science of philology could have suggested or supplied. This last work he was only permitted to commence. Exhausted at length, not only by the labours above mentioned, but by every form of contribution to the many literary societies of which he was a prominent member, by the constant production of improved and enlarged editions of his numerous works, and by a general literary activity as ceaseless as it was successful, he sank, after a short but severe illness, borne with the utmost patience and resignation; and has left to us a proof that in this country the scholarship of Bentley and Porson is still to be found in all its maturity and excellence.

Sir Charles FELLOWS was born in 1799, and at an early age showed himself to be endowed with the all-important qualities for the future traveller, of observation, quick perception, and artistic talent. Thus, at the age of fourteen, he illustrated by sketches, an excursion to the ruins of Newstead Abbey, then occupied by the youthful Byron, and these very sketches were engraved, twenty-five years afterwards, on the title page of the *Life of Byron*, published by John Murray. During the next six years he travelled through all parts of England, Wales, and Scotland. In 1820 he removed to London, where he at once entered into the best scientific and literary society of the day, joining many of the institutions; and he was amongst the earliest members of the British Association for the Advancement of Science. In 1827 he became a daring Swiss traveller; the first to traverse the Blumlis Alps at Kandersteg, and the discoverer of the modern route to the summit of Mont Blanc. He wrote an account of his ascent in an unpublished volume, elegantly illustrated with the first views which had ever been taken in that icy region. In 1832 he lost his mother, to whom he had been devotedly attached, and after this event his travels became more extended, spending during the next ten years the greatest part of each

year in Italy, Greece, and the Levant. The use of his sketches is acknowledged with gratitude by Mr. Murray, who speaks of them as the chief source of the *Illustrations to Childe Harold*, engraved by Finden.

In 1838 Mr. Fellows started on an expedition into Asia Minor, his chief inducement in going there being his love of beautiful scenery, and his admiration of the simple character of its peasant class. He commenced by making short excursions around Smyrna, and eventually returned to that city, having ridden over more than 4000 miles of country then little known to Europeans. During five years from this time, Mr. Fellows made four separate tours in Asia Minor, chiefly to the provinces of Ancient Lycia, with which he has completely identified himself. His works upon the subject are, '*Asia Minor*,' 1839, '*Discoveries in Lycia*,' 1841, '*Xanthian Marbles*,' 1843, '*Ioni's Trophy Monument*,' 1848, and lastly a very ingenious and logical work, entitled, '*Coins of Ancient Lycia before the reign of Alexander*, with an *Essay on the relative dates of the Lycian monuments in the British Museum*,' 1855.

On the 7th May, 1845, Her Majesty conferred upon him the honour of Knighthood, "as an acknowledgment of the services rendered by Mr. Fellows in the removal of the Xanthian Antiquities to this country."

In the works of Sir Charles Fellows, above-mentioned, will be found the details of his archaeological discoveries. In Lycia alone he examined the ruins of eleven cities never before visited. On his fourth and final expedition he had the management of a large party, consisting of more than a hundred men from Her Majesty's navy, besides stonemasons from Malta, men from Rome for taking casts, carpenters, interpreters, &c., an English artist and architect as companions and assistants. The portfolios of drawings, architectural measurements, and inscriptions, together with an account of the expeditions, as well as numerous specimens of natural history collected in Lycia, were presented by him to the British Museum in the spring of 1844.

Joseph James FORRESTER, Baron de Forrester of Oporto, was drowned in the river Douro by the upsetting of a boat on the 12th of May last. Mr. Forrester had passed a considerable portion of his life in Portugal, and took an active part in exposing the abuses of the wine trade in that country, and published several pamphlets on the subject, as well as an essay on the most approved mode of making olive-oil. The Baron devoted twelve years to the survey

of the river Douro, with a view to the improvement of its navigation, the result of his labours being embodied in a large and beautifully engraved map, a copy of which he presented to this Society. In acknowledgment of this work, he received the warmest expressions of approbation from the Municipal Chamber of Oporto, the Agricultural Society of the Douro, and other municipal and public bodies. His surveys were adopted by the Portuguese Government as national works, and reprinted in England by order of House of Commons, and he was elected a member of the Academy of Sciences of Turin, and of the Geographical Societies of Paris and Berlin, and was honoured with decorations by the King of Sardinia. Mr. Forrester competed for and gained the Oliveira prize for his Essay on Portugal, two editions of which have been published, and he has since written some pamphlets on the Oidion or vine disease.

Lionel GISBORNE was born at St. Petersburg, in the year 1823. He was educated partly in that city, partly at Repton School in Derbyshire, and partly at Geneva. He thus acquired a familiarity with French, and several other European languages, which was of the greatest service to him in after life. At the age of sixteen he returned to England, and shortly after entered the engineering department of the University of Durham; after graduating there he proceeded to Ireland, where he remained for nine years, first in the service of the Shannon Commissioners, and afterwards in that of the Board of Public Works. During this long period he made himself thoroughly acquainted with several important branches of his profession. He was employed principally upon the works undertaken for the improvement of the navigation of the Shannon, and for the arterial drainage of the country. He was also engaged in the relief works which were set on foot during the Irish famine, and at one time had several thousand men at work under him. In all these employments, and especially in the last, he had many opportunities of displaying that promptitude and decision in emergency, and that power of influencing, attaching, and working with other men, for which he was so greatly distinguished in after life.

In the year 1853 Mr. Gisborne was requested to undertake an expedition to the Isthmus of Darien, for the purpose of ascertaining the possibility of uniting the Atlantic and Pacific Oceans by a ship-canal. Accompanied by his friend Mr. M. C. Forde, he unfortunately arrived during the rainy season, and was prevented by the weather, and by illness, and also by the opposition of the

natives, from completing this survey. The next year Mr. Gisborne again proceeded to the Isthmus, accompanied by several other engineers, and by some troops provided by the Government of New Grenada. Shortly before his arrival two unsuccessful attempts had been made to cross the Isthmus; one by Captain Prevost of the Royal Navy, the other by Lieutenant Strain of the United States Navy. Mr. Gisborne and his party accomplished this, and the whole intervening country was carefully surveyed. It was found that the height of the mountains, forming the axis of the Isthmus, was so great as to render the construction of a ship-canal impossible, except at an enormous cost.

In the year 1852 Mr. Gisborne first entertained the idea of a scheme for the embankment of the River Thames. In 1853 carefully considered plans were made out and submitted to the Government. Mr. Gisborne also published his views in a printed statement which was widely circulated. Ultimately a bill for carrying the scheme into effect was introduced into the House of Commons; it passed the second reading, but was withdrawn in consequence of the outbreak of the Russian war. It is not too much to assert that the various plans for the embankment of the Thames which have been produced—some one of which now seems likely to be carried into effect—were all, to a considerable extent, founded on that originated by Mr. Gisborne. Besides the undertakings already mentioned, Mr. Gisborne was employed in engineering works in various parts of the continent; in Sweden, Switzerland, Naples, Russia, and France. In 1855 he began to turn his attention seriously to the subject of submarine telegraphy. In that year he went to Constantinople, and obtained from the Turkish Government the concession for the Dardanelles and Alexandria telegraph; whilst in the latter part of the same year his brother, Mr. Francis Gisborne, succeeded in obtaining from the Porte the concession for the Red Sea and Indian Telegraph. In 1859 Mr. Gisborne proceeded to the Red Sea to superintend the submersion of that part of the cable which was to connect Suez with Aden. This was successfully performed in the spring of the year, and on its conclusion he embarked on board the Peninsular and Oriental Company's steamer *Alma* on his return to Suez. The history of the wreck of the *Alma* is well known. The crew and passengers remained for four days upon a coral-reef near the island of Little Horvish, exposed to the intense heat of the climate, and almost without fresh water. Mr. Gisborne distinguished himself greatly

in saving the women and children, and in superintending the arrangements made for their safety and convenience while upon the reef, and received from his fellow passengers an address expressive of their sense of the services which he had rendered them. This was his last voyage. He had for some years been suffering from an affection of the heart, which was greatly aggravated by the exertions he made and the sufferings he underwent in the Red Sea; his health rapidly gave way during the autumn and winter of 1860, and he died in London on the 8th of March, 1861.

Mr. Herbert INGRAM, M.P., the well-known founder and proprietor of the '*Illustrated London News*,' together with his eldest son, was lost last year in the fearful accident on Lake Michigan. By his enterprise and talent Mr. Ingram had risen from the position of a country news-vender to the responsibilities of a newspaper proprietor, a member of Parliament, and a Deputy-Lieutenant. He was a Fellow of the Society of Antiquaries as well as of this Society.

Mr. Robert JAMIESON was an enlightened philanthropist, who had for many years devoted time and wealth in endeavours to civilize the native races of Africa.

In 1839 he built and fitted out, with much care and expense, the *Ethiops* steam-ship, appointing to her command the late Captain Beecroft, to whom he gave minute and ably-written instructions for his guidance in exploring and trading voyages. Narratives of her successful voyages were published by Mr. Jamieson, and others are given in the Journals of the Royal Geographical Society.

It will be recollected that it was Beecroft, in the *Ethiops*, who steamed to the rescue of H.M.S. *Albert*—one of the vessels of the Government Niger Expedition, famous for its misfortunes—and brought her down the river and saved a remnant of her crew from that fearful fever of which their comrades had perished. Against the project of this disastrous expedition Mr. Jamieson had earnestly protested in two published appeals. In 1859, Mr. Jamieson published a tract, entitled '*Commerce with Africa*,' pointing out the benefits that might be obtained by establishing a short inland communication between Cross River and the Niger, to avoid the swamps of the Delta; but his advancing years and failing health precluded further active exertions.

Macgregor LAIRD was born in Greenock in 1808. After completing his education at Edinburgh, he entered into partnership

with his father, the late Mr. William Laird, in an engineering establishment in Liverpool, which he shortly afterwards relinquished in consequence of the field for enterprise seemingly opened up in Central Africa by the important discovery of the Landers, tracing the course of the river Niger to the sea. He took an active part in forming the Company which, in 1832, despatched from Liverpool an expedition consisting of two steam-vessels, under the command of Richard Lander, with whom Mr. Laird was associated in carrying out the enterprise. One of the steamers, the *Albion*, was designed and built by Mr. Laird, being the first iron vessel that performed a sea voyage. The result of this expedition is generally known from the interesting and spirited narrative published by him. It was attended with a melancholy loss of life: for, out of the 48 Europeans who started with it, nine only survived. The steamers reached the confluence of the rivers Niger and Chad, whence, suffering severely from the effects of the climate, Mr. Laird penetrated as far as Funtua, having been carried on a litter the greater part of the way. He returned to Liverpool in 1834, with his health much impaired by the hardships he had undergone, from which his constitution never fully recovered; and to which may be attributed his untimely death, at the age of fifty-two.

Mr. Laird next turned his attention to Atlantic steam navigation, and formed a Company, in 1837, with that object. The *Sirius* was despatched by them in April, 1838, and accomplished the first steam voyage across the Atlantic. She was followed shortly afterwards by the *British Queen* and *President*, built by the same Company, each upwards of 2000 tons—a decided stride in advance at the time, though we have since seen that tonnage greatly exceeded.

Mr. Laird removed to Birkenhead in 1844, where for several years he took an active part in furtherance of the great works in that place which has since risen, and is still increasing, so rapidly in importance. On his return to London he devoted the last twelve years of his life exclusively to the development of the resources of Africa, more especially towards establishing that trade with the interior which he had perseveringly advocated as the best means of counteracting and finally extinguishing the slave-trade. Having obtained a contract from Government, he established the African Steam-Ship Company, which maintains a monthly communication with the various ports on the coast as far as Fernando Po. But Mr. Laird did not rest satisfied with the

development of the coast-trade alone. He acted upon the idea of cutting off the slave-trade at its source by introducing into the interior habits of peaceful industry, and ultimately rendering the river Niger the highway of legitimate commerce. With these views he fitted out, in 1854, a trading and exploring expedition at his own expense and risk, but with Government support, which ascended the river Chadda, in the steamer *Pleiad*, 150 miles beyond the point previously reached. This voyage was distinguished by the gratifying and remarkable circumstance, that not a single death occurred during its progress—a result to be attributed mainly to the use of quinine as soon as the river was reached, as well as to the general excellence of the equipment and arrangements of the expedition.

Encouraged by this result, Mr. Laird prevailed on the Government to enter into contracts for annual voyages up the river, and for this purpose built the steamers *Dayspring*, *Sunbeam*, and *Rainbow*, which have made repeated ascents. The *Dayspring*, having reached Rabba, on the Niger, in safety, was lost in a rapid a few miles above that place; and the *Sunbeam* is now on the coast waiting the rising of the river for another ascent. Mr. Laird also established trading depôts at the confluence of the Niger and Chadda, and at various places lower down, which are still in active operation.

It is due to the memory of Mr. Laird to state that he persevered in these undertakings with little or no prospect of personal advantage, and that, while in early life he participated to some extent in African exploration, he also deserves credit for his steadfast endeavours to promote the geographical discoveries of others.

Joseph LOCKE, M.P.—Foremost among the engineers who followed in the footsteps of George Stephenson we find the names of Robert Stephenson, Brunel, and Locke; and it is singular that, having passed many years in amicable rivalry—Brunel advocating the extension of his broad-gauge lines and its vast works; Stephenson and Locke, on the other hand, giving preference to the narrow-gauge; and the latter insisting upon the necessity of economy in construction—they should all three have passed away at very nearly the same age, and within a short period of each other, leaving works which will bear testimony in future ages to the enterprise and public spirit of the times in which they flourished. Mr. Locke's numerous lines of railway in Great Britain and the Continent are characterised by economy of construction, owing to the introduction of steeper gradients than those which had usually been

adopted. Well acquainted as he was with the powers of the locomotive-engine, he did not hesitate to impose upon it tasks which his predecessors had thought beyond its power. Thus the line from Lancaster to the north rises 1000 feet above the level of the sea, avoiding tunnels or the very heavy works which an adherence to easy gradients would have rendered necessary. The true monument of his eminent engineering skill is therefore to be found in those numerous districts which could never have supported the expense of railway communication under the old system, but have already realised its advantages under that of Mr. Locke.

Captain Alexander MACONOCHE, R.N., R.M., entered the Royal Navy in 1803. He was employed off Ferrol under Captain the Hon. A. Cochrane, and thence proceeded in pursuit of a French squadron which had escaped from Rochefort. He subsequently served in the West Indies, and received his Lieutenancy in 1809; he was afterwards appointed to the *Grasshopper*, in which, in order to avoid being lost as was her consort the *Hero*, he surrendered to the Dutch fleet in the Texel. On his restoration to liberty in 1814, he served again under his old chief Sir A. Cochrane, and was afterwards promoted to the rank of Commander.

Captain Maconochie was appointed Secretary to this Society at its foundation in 1830, an office which he filled for several years, and in token of the estimation in which his services were held, the following Resolution was passed by the Council on his resignation in 1836, and was duly recorded in the Minutes.

Resolution passed at the Council Meeting, May 23rd, 1836.

"THAT, in announcing to the Society the resignation of their late Secretary, Captain A. Maconochie, R.N., the Council feel it incumbent on them to record, in the most public manner, their unqualified approbation of the manner in which Captain M. has performed the duties of Secretary, and at the same time the regret they feel that the Society is about to be deprived of his services.

"Captain Maconochie was among the foremost promoters of the Royal Geographical Society, and has never failed to evince the warmest zeal for its prosperity, and to devote himself at all times, and under all circumstances, to the furtherance of the views for which it was established.

"In the preparation of the various matters of business for the Meetings of the Council, and for the Ordinary and General Meetings of the Society; in the immediate management of the Finances of the Society, under the Council and Treasurer; in the superintendence of the operations required for the Publication of the Society, all the Papers in which have undergone the most rigid scrutiny on his part to insure their accuracy, and many of which are

wholly due to the zeal and labour with which he has abstracted the most valuable matter from documents too voluminous to be published *in toto*; and in the candour, judgment, and temper which he has always evinced in the discharge of his duties as Secretary, Captain Maconochie has shown himself in every respect worthy of the confidence which has been reposed in him by the Royal Geographical Society, in general, as well as by the Presidents and Councils by which the affairs of the Society have been successively administered."

Captain Maconochie for some time held the appointment as Secretary to the Governor of Van Diemen Land. He was the inventor of the Mark System of Prison Discipline, author of many papers on that subject, and superintended the penal establishment, Norfolk Island.

Mr. John Henry MANDEVILLE, late Minister Plenipotentiary to the Argentine Republic, was born in Suffolk in 1773. He was the oldest surviving member of the diplomatic service, his long career embracing an extraordinary variety of incidents and events. As a boy he entered the navy, but subsequently held a commission in a dragoon regiment. He was selected to be the British Agent in France for the exchange of prisoners before the peace of Amiens; was attached to Lord Whitworth's Embassy; was Secretary to Sir Arthur Paget at Vienna in 1805; served in the missions of Frankfort, Constantinople, Lisbon, Paris, &c., and in 1835 was appointed Minister Plenipotentiary at Buenos Ayres, where he remained until 1846. Mr. Mandeville's great experience and retentive memory rendered him a most agreeable companion, and he continued to fill a distinguished place in society to the last day of his protracted life of nearly 88 years.

Mr. J. W. PARKER, son of the eminent publisher, died in the latter part of last year. He possessed learning and ability, and for some years past he had been accredited with having no inconsiderable share in the management of the well-known 'Frazer's Magazine.' He was elected a Fellow of the Society in 1852, and evinced great interest in all its proceedings up to the time of his death.

General Sir Charles W. PASLEY, K.C.B., D.C.L., F.R.S., &c., was educated for the Royal Artillery, and in that branch of the army obtained his commission as second lieutenant in December, 1797, but he removed to the Royal Engineers the following year. He was present at the defence of Gaeta, the battle of Maida in 1806, and in 1807 at the siege of Copenhagen. Subsequently he took part in the retreat to and battle of Corunna, and again

was chief-engineer to the Marquis of Huntley's division in the Walcheren Expedition. Since 1812 his services have been required in England. First he was appointed to the Plymouth division, then director of the Royal Engineer establishment at Chatham. It was when thus engaged that he undertook the task of blowing up the *Royal George*, at Spithead. His last appointment was Inspector-General of Railways in the Board of Trade. He was the inventor of some improvements in pontoon bridges, and author of a treatise on 'Military Instruction,' 'An Essay on the Military Policy and Institutions of the British Empire,' and other professional works.

During many of the last years of his life, this gallant veteran was a frequent attendant at the meetings of the various scientific societies of which he was a member, including the Royal, Royal Geographical, Geological, Astronomical, and Statistical Societies, and was an energetic supporter of our Anniversary Meetings.

Sir Geo. SIMPSON, when a youth, was received into the counting-house of a London firm, largely engaged in the West India trade. His active and energetic habits soon attracted the notice of the late Earl of Selkirk and of the late Mr. Andrew Colville, both of whom took prominent parts in the rivalry then carried on between the Hudson Bay and North-West Companies, in the former of which they were large stockholders. Through their influence Mr. George Simpson was selected to superintend the affairs of the Hudson Bay Company at their settlements in British North America, and he proceeded thither in February, 1820. A coalition of the rival Companies having taken place the following year, he was appointed resident Governor of Rupert Land, an office which he held till the day of his death, in last September. By his address and dexterity he softened, and ultimately removed, the enmity and rancour which rivalry had created between the officers and men of the two Companies, and by his own example taught men to work amicably together to promote the interests of the new association. His experience in the Indian country, his intimate knowledge of its resources, and his influence both with its white and Indian population, tended greatly to facilitate the progress through it of the land Arctic expeditions fitted out by the Government, and to lessen the hardships and privations they had to encounter.

The Arctic expeditions undertaken by the Hudson Bay Company were planned and fitted out under his immediate direction, and the instructions which he gave to their respective commanders, inde-

pendently of their admirable adaptation to the ends in view, were eminently calculated to promote the objects for which they were issued. For these he received the honour of knighthood in the year 1841; and on the 3rd of March of that year he set out from London on his overland journey round the world, which he accomplished in 19 months and 26 days. Of this journey he published a narrative four years afterwards.

In conclusion we may remark that his suavity of manners, his patience, fortitude, and resolution amidst scenes of trial and difficulty, his unflinching and disinterested devotion to business, the amazing accuracy and extent of his knowledge of the affairs over which he presided, and the masterly readiness and precision with which he invariably applied it, rendered him eminently qualified for the situation he held during 40 years in the service of the Hudson Bay Company.

The late Mr. Matthew UZIELLI died, after a short illness, at Ostend, on 5th October, 1860. Although not a man of science, his memory deserves a passing tribute on this occasion, as having been one of those useful members of the Society whose fortune is ever ready to sustain and promote the cause of art and science. As an illustration of his liberal spirit, the Anniversary Address of 1856 of our President, the late Admiral Beechey, records the following:—

“I cannot quit the subject of this expedition without mentioning an instance of rare liberality in the cause of geographical science which was communicated at one of our evening meetings during this session by Count Strzelecki. When the North Australian Expedition was first planned, and when, owing to the length of time which had elapsed before it started, it was supposed that funds were wanting to carry it out, an associate of this Society, Mr. M. Uzielli, generously offered to place the munificent sum of 10,000*l.* at its disposal. Another of our associates, Mr. W. S. Lindsay, *M.P.*, had also previously offered to contribute largely towards the outfit of the expedition. As, however, the Government have taken the matter into their own hands, these gentlemen have not been called upon to fulfil their promises; but we must still look upon the offers as proofs that the labours of the Geographical Society are fully appreciated by practical men, and of the zeal that exists among us for the advancement of geographical knowledge.”

But, independent of this offer, and his subscription of 10,000*l.* to the Guarantee Fund for the Exhibition of 1862, Mr. M. Uzielli was a constant promoter of philanthropic objects; and appeals in

cases of general or individual distress were seldom made to him in vain.

John Ashley WARRE, M.P., was educated at Harrow and at Christ Church, Oxford, which he entered as a gentleman commoner. His political life extended over thirty years, having first represented Lostwithiel in 1812, and subsequently Taunton, Hastings, and Ripon. He was a steady, consistent Whig, of the old and most confirmed school, and advocated earnestly those great measures of Reform which at first caused so much uneasiness and alarm in the minds of many, but which are now acknowledged to be among the greatest blessings ever conferred on a nation.

That his services were duly appreciated may be inferred by his having been offered office more than once, but which, from an inherent sense of the value of freedom of action, he steadily declined. He knew how to be liberal in support of the principles to which he was attached without illiberality towards those from whom he widely differed; and for many years he enjoyed the friendship of many with whose political principles he had no sympathy.

His was no common mind: it was so well stored on every subject—the result of close study and deep thought—that it would have been difficult to find a topic for discussion on which he was not prepared to offer a ready remark.

His memory of past events generally, but more particularly of the navy, for which he entertained a perfect affection, was very remarkable. The glorious deeds of early naval history were accurately related in the most graphic manner, and he was equally well-informed on all the economy of modern improvements. Indeed he was a living naval chronicle.

In many of the scientific questions of the day, and especially with those advocated by this Society, he took an earnest interest, attaching himself to the gallant leaders in such matters, and entering warmly into the discussion of their particular theories. Such were ever welcome guests at his hospitable abode, and never left it without feeling that he had not only “entertained” them, but had communicated information well worth their remembrance.

Equally simple and unostentatious in manner, few men were more respected. Where his heart prompted, his hand obeyed; and numbers blessed a generosity that did good far and wide, without pretension and without display.

He was earnest and devout, making religion the principle of

life; and none ever heard from his lips a word that lacked charity to others.*

ADMIRALTY SURVEYS.—By CAPTAIN WASHINGTON, R.N.

The Coast surveys in course of execution, under the orders of the Admiralty, both at home and abroad, have made fair progress during the past year. They are conducted by twenty different surveying parties, one-half of whom are employed on the coasts of the United Kingdom; the remainder in the colonies of Australia, Cape of Good Hope, West Indies, Nova Scotia, St. Lawrence, and Vancouver Island; also on the coast of Syria, in the Turkish Archipelago, in Banka Strait, China, and Japan.

England.—On the south coast, Commander Cox and Mr. Davis, R.N., carefully sounded the bar of Portsmouth Harbour at the end of May, 1860, in order to ascertain the effect produced upon it by the dredging that had taken place during the past year. The soundings were made in sections, with intervals of only 8 yards between each cast of the lead, the lines of section were 17 yards apart, and the whole plotted on a scale of 60 inches to a mile. This operation has just been repeated by Messrs. Taylor and Reed, R.N., the soundings being accurately reduced to the same datum; and it is satisfactory to be enabled to state that a depth of nearly 6 feet has been gained over the greater part of the bar, and that a small amount of further dredging, so as to equalize the surface of the ground, will give a depth of 18 feet into the harbour at low water, or of 27 feet at high-water neaps, and 30 feet at high-water springs, thus greatly increasing the value of Portsmouth as a harbour. In the Channel Islands, Commander Sidney and Mr. Richards, R.N., have completed the survey of the east coast of Guernsey and of Sark, and sounded over an area of 50 square miles; in the course of their examination it has been found that the depths over the great bank off Guernsey have materially decreased since the year 1821.

On the coast of Devon, Captain Stokes and Mr. Usborne, R.N., have completed 5 miles of open sea-coast to the eastward of the Mewstone, and about 21 miles of the shores of the Yealm River, and partially sounded over an area of 62 miles, including Bigbury Bay, and to a distance of 5 miles off shore; while the plan of

* In addition to the above names, the Society has to regret the loss of Major Henry Cracroft; Colonel R. K. Dawson; General P. De la Motte; W. T. Laroche; G. F. Leslie; Capt. P. Margesson; and A. Milne.

Plymouth Sound and Hamoaze, by Commander Cox, on the scale of 10 inches to a mile, has been published at the Admiralty. In the Scilly Isles, Captain Williams and Mr. Wells, R.N., have been occupied in making and computing the triangulation of the group, during which the positions of 518 stations on the islands and rocks have been fixed and plotted ready for delineating the high and low water features, on the scale of 6 inches to the mile, comprising altogether about 50 miles of coast-line. In the Bristol Channel, Commander Alldridge, with his assistants, Messrs. Hall, R.N., and William Quin, have been employed on the coast of Glamorganshire, during which 21 miles of open sea-coast have been surveyed, and an area of 88 square miles sounded over, in the course of which 18,600 casts of lead were made and recorded, and some small rocks and shoals discovered. A chart of the same coast, from Nash Point to New Passage, on the scale of 1 inch to a mile, and a plan of Swansea and Neath, on the scale of 3 inches, have been published by the Admiralty during the past year. On the coast of Lancashire, Mr. E. K. Calver, R.N., with his staff, Messrs. Inskip and Davison, have re-examined the estuary of the river Ribble, leading up to the town of Preston, with its approaches, and corrected the charts of that part of the coast.

Scotland.—In the river Clyde, the same officers, Mr. Calver and his assistants, have made a new survey from Greenock to Glasgow, showing the changes that have taken place during the last thirty years. The river was sounded in sections, in great detail, and laid down on a scale of 15 inches to a mile, so that the plan will form a standard for reference at any future period. It may serve as a specimen of the minuteness with which such works are done, to learn that in the course of this examination and that of the Ribble, 18,657 soundings were taken, and nearly all plotted.

In Argyleshire, Commander Bedford, with his assistants Commander Croyke, Mr. Bouchier, and latterly Mr. Ray, R.N., and Mr. Stafford, have been engaged on the survey of Loch Linnhe, leading up to the south-west entrance of the Caledonian Canal, and of the outlying rocks Dubh-Artach. In the course of this survey they have examined 70 miles of coast, and sounded over an area of 100 square miles. The western portion of the Isle of Mull has been published, on the scale of an inch and a-half to a mile; the north-west coast, drawn on double that scale, together with a plan of Loch Cuan on the 6-inch scale, is engraving, in order to meet the wants of the trade now springing up between the islands of Mull and Coll.

In Inverness-shire, Mr. Jeffery, R.N., with his assistants Messrs. Donald Matheson and James Hannan, has mapped the coast between Arasaig and Smirserei Points, on the scale of 6 inches, and Lochs Moidart and Kinhay, on the scale of 9 inches to a mile. In the Hebrides, Captain Otter, in the *Porcupine*, with her tender the *Seagull*, Lieutenant Chimmo, aided by his staff, Lieutenants Dent and Hawes and Messrs. Stanley and Boulton, R.N., have been employed on the west coast of North Uist, between that island and St. Kilda, and on part of the Islet of Rum; in the course of which they have mapped 138 miles of coast-line, and sounded over an area of 575 square miles. In their trip to the rarely-visited island of St. Kilda, they found the population, which appears to be stationary at 78 persons, suffering from famine, due to a loss of their crops. On this being made known in Scotland, it was immediately met by a most liberal subscription, that not only sufficed to relieve their hunger, but to establish some more permanent benefits for the use of the poor islanders. In Harris, Commander Thomas, with his assistants Messrs. Morrison and Sharban, has surveyed the Sound of Taransay and the East Bays, on the scale of 6 inches. All the above data have been added to the general chart of the west coast of Scotland, and the detailed charts are in progress of engraving; Loch Tuadh and the isles and Loch Scridain, by Commander Bedford, are already published, on the scale of 3 inches.

Ireland.—On the east coast of Ireland, Mr. Hoskyn, with his assistants Lieutenant Aird and Mr. Yule, R.N., have been engaged on the upper part of Lough Strangford, and on the shores of County Down, from Ballyferris Point to Donaghadee. Off the south-west and south coasts, Commander Edye and Lieutenant Horner have sounded over an area of 1450 square miles, carrying their soundings to an average distance of 23 miles off shore, and to a depth of 100 fathoms; so that the navigator, if he will but pay attention to his lead, and compare the depths and quality of the bottom with his chart, may safely approach that coast by night, or in a fog.

In the course of last year several new charts of Ireland have been published at the Admiralty. Among these are Loch Larne and the entrance of Loch Carlingford, on the scale of 7 inches, by Mr. Hoskyn and staff; the coast from Larne to the Foreland, the joint production of that officer and Captain Bedford; Loughs Swilly and Mulroy, Horn Head to the Foreland, and the Foreland to Aran Island; Killibegs, Donegal, and Teelin harbours, from the surveys of Captain

Bedford, and his assistants Lieutenants Sidney, Horner, and Mr. Davis; Broadhaven, Blacksod, Tralee, and Brandon bays, by Commander Beechey and Lieutenant Edye, thus nearly completing the publication of the hydrography of the north and west coasts of Ireland.

Iceland.—The project for laying a North Atlantic submarine electric-telegraph cable from Scotland, by the Færøe Isles to Iceland, Greenland, and Labrador, so that no relay should exceed 600 miles in length, has led to the carrying a line of deep-sea soundings by that circuitous route, and a more direct return-line of soundings from Cape Farewell to Ireland. This expedition, equipped by the Admiralty in the most efficient manner, was placed under the command of Captain Sir Leopold McClintock, in H.M.S. *Bulldog*, assisted by Mr. W. H. Reed, R.N., Admiralty Surveyor, and Dr. Wallich, as Naturalist; at the same time Captain Allen Young, McClintock's companion in his memorable Arctic voyage, with Dr. Rae, Colonel Shaffner, U.S., and Mr. J. E. Davis, R.N., Admiralty Surveyor, were despatched by the enterprising Company in the *Fox* yacht, to examine the coasts and landing-places more in detail. The results, in a geographical point of view, which is our mere immediate concern at present, have been highly valuable. The depth of the ocean between Iceland and Greenland was found not to exceed 1570 fathoms, and the bottom to be fairly regular; from Greenland to Labrador, across the entrance of Davis Strait, a depth of 2030 fathoms was reached; and, in crossing the Atlantic on the return voyage, the greatest depth was found to be 1575 fathoms. At all these depths specimens of the bottom were brought up, and on one occasion a cluster of living star-fish was obtained from a depth of 1260 fathoms; a similar occurrence, proving the existence of living animals at that depth, took place in Sir James Ross's Arctic voyage in the year 1829, and in Commander Dayman's line of deep-sea soundings across the Atlantic in 1858. In order that the full benefit to science which may be derived from these specimens of the bottom should be rendered available, the Admiralty have retained the services of Dr. Wallich to examine them carefully, and prepare a full description of them, which it is understood will be published shortly.

In the course of the above voyage, in addition to the deep-sea soundings, the Admiralty surveyors, Mr. Reed, in the *Bulldog*, and Mr. Davis, in the *Fox*, took advantage of the opportunities afforded them, to make plans of several of the harbours touched at, as

Haldervig and Thorshavn, in the Færøe Isles; with the Fiords of Bern, Hval, and Igalik, on the east and west coasts of Iceland, by Mr. Davis; Julianshaab and part of Godthaab on the west coast of Greenland, and Hamilton Inlet, Labrador, by Mr. Reed: this latter inlet has assumed an entirely new form in our maps and charts from any that has before appeared. As physical geographers, we cannot but feel gratified that the requirements of submarine telegraphy conduce so much towards a better acquaintance with little known lands, and especially with the bed of the ocean of which we are still so ignorant, and with which, if submarine cables are to succeed, we believe we must be yet better acquainted. Nor can we withhold our tribute of gratitude to those gallant men who, under difficulties and privations of no ordinary character, boldly grappled with storms and ice in pursuit of the required information. Yet, though grateful, we need not be surprised. Were not both the commanders trained in the Arctic school? That school which has produced a Parry, a Franklin, the two Rosses, Scoresby, Beechey, Back, Richardson, Belcher, Bellot, Kane, Kellett, Collinson, Richards, McClure, McClintock, and others, men of all countries, to whom the Geographical Society delighteth to do honour. And I am satisfied that I do but express the general feeling of the members of this large Society in saying that wherever difficult work is to be done, in whatever part of the globe they may be found, whether with Kellett and Collinson in China, Richards in Vancouver, or McClintock in the enervating clime of the coast of Syria, where he now is, there the Arctic navigator will prove the value of the hardy school he has been trained in, and be fully entitled to share in the proud motto of *Nulli secundus*.

Mediterranean.—In the Turkish Archipelago, Captain Spratt, with his able assistant Lieutenant Wilkinson and Messrs. Stokes, Drew, and Millard, have completed the surveys of the islands of Astropalaia, Scarpanto, and Kasso, with several small harbours in Crete, and Sailing Directions for that island, all of which, with the western half of Crete, are in a forward state for publication, the Turkish, Arabic, and Greek names of places having been carefully revised by Viscount Strangford and Mr. W. Spottiswoode. Captain Spratt has also recently carried some careful and valuable lines of soundings between Malta, Tripoli, Benghazi, and Alexandria, with a view to prepare the way for a submarine electric-telegraph cable, which it is hoped will shortly connect Malta with Egypt.

On the coast of Syria, Commander Mansell in H.M.S. *Firefly*,

with his assistants Lieutenant Brooker and Messrs. Hull, Skead, and Gray, have completed the survey of the northern portion of the coast from Iskanderûn to Markab, with plans of Ruad, Tripoli, Beirût, &c., all of which have been published. In connexion with this nautical survey some travellers took advantage of the presence of a surveying vessel on the coast, and made a journey to the more important spots in the interior, and determined several positions and barometrical heights. The party, consisting of Captain Washington, R.N., Commander Mansell, Dr. Joseph Hooker, F.R.S., the Rev. George Washington, M.A., Mr. Hanbury, and Mr. Gray, R.N., being provided with three chronometers, a theodolite, six barometers (corresponding observations being carried on night and day on board the *Frigate* on the coast), left Beirût in September last, by way of the Nahr el Keib, Akturah, Afka, and Bisherreh, to the Cedars of Lebanon.

This remarkable group of trees, not exceeding three-quarters of a mile in circuit, stands on an elevated plateau, at the head of Wady Kadisha, and forms the centre of a semicircular basin or recess in the Lebanon, from 6 to 8 miles in diameter, at an elevation of 6400 feet. It is all but encircled by a wall of barren grey limestone mountains, rising some 3000 feet above the plain. The cedars stand alone, upon several small knolls (possibly a broken-up moraine deposited by former glaciers), and there is but one other tree in sight. The trees are about 400 in number, of all sizes; the largest is 40½ feet in girth, but only a few of the old patriarchs remain; there are not more than eight trees above 20 feet in girth. It is understood that Dr. Hooker is of opinion that, judging from the number of concentric rings and other indications, there is no tree now existing more than 500 years of age, and none less than 30 years.

On leaving the Cedars two of the summits of Lebanon were ascended; the highest Dahar el Khâdib, 5 miles to the north, was found to be 10,400 feet above the sea, and afforded a magnificent prospect which was taken advantage of by Commander Mansell, who planted a theodolite on it and obtained a round of angles to Tripoli, Cape Madonna, and other points on the coast to the west, to Mount Casius very distant in the north, to Ba'albek, Hermon, Sunnin, and other points in the south, and to all the peaks of the Anti-Lebanon in the east and south-east, which were thus connected with the coast survey.

Proceeding onwards the party crossed the elevated plain of Cœle-

syria, or El Buka'a, where the watershed, between the Orontes, flowing to the north-east, and the Leontes to the south-west, is near 4000 feet high, and reached Ba'albek or Heliopolis, with its marvellous ruins, at the western foot of the Anti-Lebanon range, and 3700 feet above the sea. Thence by Zebedani and round the southern end of Anti-Lebanon to Damascus. This city also lies in an elevated plain, but fully 1000 feet lower than Ba'albek, or about 2500 feet above the sea. Returning thence by Zaghleh and the admirable military road from Beirút to Damascus, now in the course of construction by the French, which will cross the Lebanon at a height exceeding 5000 feet, the party went to Beirút, Sidon, Tyre, Akkah, Hhaifa, Mount Carmel, and by Yafa to Jerusalem. Among other elevations measured in the City of David, the highest point of Mount Zion was found to be 2600 feet above the level of the Mediterranean, and the summit of the Mount of Olives, about 100 feet higher, while the lowest point of the Valley of Hinnom was 700 feet beneath. Jericho, Bethlehem, and the Dead Sea, were also visited, and the remarkable depression of the surface of this latter sea of 1300 feet below the level of the Mediterranean, which has been observed by former travellers, was fully verified.

It is right to add that Van de Velde's map of Palestine, by Petermann, based upon the trigometrical survey by our countryman, Lieutenant Symonds, R.E., in 1841, and combining the researches of Eli Smith and Dr. Robinson of the U. S., and other travellers, was found to be generally correct, and the best map of the country published. While Murray's '*Handbook*,' here as elsewhere, proved to be invaluable; nor can travellers in these regions adequately express their thankfulness for the aid derived from this work: it is no exaggeration to say that it adds tenfold to the interest, the benefit, and the enjoyment of the tour. Probably, too, the present party was the first who had been enabled to refer on the spot to the '*Biblical Dictionary*' edited by Dr. William Smith, and to test, book in hand, the marvellous accuracy and research displayed by the several learned contributors to that work.

The barometrical heights, by Von Willdenbruck, were found to agree better with the observations of the expedition than the measurements of any other traveller. It may be worth notice that a complete meteorological register for 12 years, from 1848 to 1860, has been kept by the late Dr. McGowan at Jerusalem, and his barometer (one of Newman's) on being compared with a standard, was found to be in good order. The geographical information obtained during

the above journey will, it is understood, be embodied in the Admiralty charts of the coasts of Syria and Palestine, now in course of publication.

Africa.—On the west coast of Africa six sheets of the Kawara or Niger, by Lieutenant Glover, R.N., on the scale of one inch, and a detailed plan of the port of Lagos, have been published during the past year. At the Cape Colony, Mr. Francis Skead, R.N., has completed a large plan of Table Bay, on the scale of 8 inches; he has also re-examined the lower part of the Kongone, one of the safest entrances of the Zambesi. In the Red Sea, in the Strait of Jubal, Commander Mansell and Mr. Hull, in addition to their services on the coast of Syria, have re-examined the Ashraffi reef, and determined the site for a lighthouse, which it is hoped may be shortly built by the Egyptian Government, as it is much required in the narrow passage of that Strait.

Asia.—In the Persian Gulf, Commander Constable and Lieutenant Stiffe, of H.M. Indian Navy, have completed the gaps that were left in the survey of that gulf, revised the whole in position, and the charts are in the hands of the engraver; while Lieutenant Heathcote, R.N., has prepared a new chart of the Bay of Bengal, with a memoir, showing the currents that prevail in that sea during the southern monsoon.

The great pearl-fisheries of the gulf of Persia are still in full activity, and as productive as of old. In the summer of 1859 there were employed no less than 2340 Arab boats, with crews of from eight to thirty men, in this branch of industry; the value of the pearls raised being estimated at 200,000*l*.

An admirable survey of part of the Shat el Arab, and of the city of Basrah, has been made by Lieutenant Collingwood, of Her Majesty's Indian Navy. Lieutenant Williams, R.N., in the surveying brig *Euphrates*, having finished the examination of a small portion that was wanting to complete the coast commonly called the Malabar Coast, has gone to do some work on the coast of Ceylon. A survey of the rivers of the Panjab is in progress by Lieutenant Whish, R.N. Two surveying brigs, under Lieutenants Sweny and Jackson, R.N., are at work in the Bay of Bengal.

In Ceylon, Captain Pullen, in H.M.S. *Cyclops*, and Mr. G. F. Macdougall, R.N., have surveyed the dangerous rocks known as the Bassas, and examined the south-east coast of Ceylon, Galle Bay, and a part of the north-east coast of the island, all of which has been inserted in the Admiralty charts. On his passage to England Captain Pullen re-determined the position of the San Lazaro

bank, in the Mozambique Strait, said to have only $3\frac{1}{2}$ fathoms over it; he also obtained several deep-sea casts of the lead, one of 2700 fathoms in the South Atlantic, one of 1800 fathoms on the Equator in longitude 20° w., and has swept away the vigia Devil Rock from its usual position in our charts, by dropping his lead on the site, and ascertaining that there is a depth of 2200 fathoms there, thus proving that no such danger can exist within a radius of 30 miles.

Two new charts of Banka and Gaspar straits, embodying all the surveys of Mr. Stanton, and his assistants, in H.M.S. *Saracen*, with the labours of the U.S. squadron, and of the Dutch surveying officers in Batavia, have been published at the Admiralty within the past year, and the Stanton Channel, along the coast of Banka, is now well known to every Eastern navigator.

China.—The requirements of the war, and the valuable assistance afforded by the Commander-in-Chief, Vice-Admiral Sir James Hope, have led to great activity in the surveying operations in China and the Korea during the past year. Commander Ward, in the *Actæon*, and Lieutenant Bullock, in the *Dove*, with their assistants Messrs. Kerr, Blackney, Farmer, Redwell, Ellis, and Robinson, have surveyed Ta-lien-hwang Bay on the northern side of the strait of Pechili, where our fleet and army assembled preparatory to the late successful expedition which terminated in the capture of the Chinese capital, the restoration of peace, and the enlargement of commerce. Also the northern coast of the province of Shantung, with the anchorage off Chifu, the rendezvous of the French force, the Miau-tau group of islands, forming the strait of Pechili, and including the anchorage of Hope Sound, and, in fact, completing the shores of the gulfs of Pechili and Liau-Tung, from Staunton Island at the south-eastern extremity of Shang-Tung Promontory on the south, round to Ta-lien-hwang Bay on the north, embracing a coast-line of about 800 miles, hitherto but vaguely known, and very erroneous in position. On the eastern side of Liau-Tung Gulf occur Niū-chwang, one of the trading-ports under the treaty, Hulu-Shan Bay and Port Adams, plans of which are in course of publication. In this latter portion the surveyors had the assistance of Commander Bythessea, v.c., and the officers of the *Cruiser* and *Staney*, and it is gratifying to find that these young officers were ready to take an active and efficient part in the operations of the survey. When we look upon our maps and see the small space occupied by the Gulf of Pechili, we are apt to form but a very inadequate idea of the extent of labour required to map its shores, but if it be recollected—

that in the course of this survey some 800 miles of the coast were examined and the positions of all important points fixed astronomically, those acquainted with the subject will be able to appreciate the material additions to our knowledge of the geography of China which has thus been obtained, and which could not have been accomplished without the cordial co-operation of the Naval Commander-in-Chief on that station, to whom, as geographers, our thanks are heartily tendered.

Australia.—While inland discovery has been making rapid strides, the coast surveys in Australia have been rather in abeyance. Captain Denham, in H.M.S. *Herald*, after a prolonged stay of nine years on the station, has just arrived in England. On the passage through Torres Strait this officer was enabled to clear away some more of the reputed dangers of that passage, and to fix the position of certain shoals, a piece of good service rendered to navigation, as this route is fast becoming the highway between Sydney, Singapore, and China. And the Sailing Directions for this track, just completed by Commander Yule, will be a valuable boon to the mariner. In the new colony of Queensland, Mr. Smith, R.N., has recently examined Port Denison and the mouths of the Burdekin river, while a general chart of Tasmania, prepared under the superintendence of Mr. Fred. J. Evans, R.N., and including the portions surveyed by Mr. Douglas of Adelaide, and one of the southern portion of Australia, have been published by the Admiralty. A fresh impetus is, we trust, about to be given to the coast surveys of these colonies, as they have liberally offered to share the expense of an Admiralty survey, and five separate parties of surveyors have been organized for the purpose. Commander Cox, with a staff of assistants, Messrs. Bouchier and Boulton, R.N., and Mr. McHugh, have already broken ground at Melbourne, and are employed upon a detailed survey of Geelong Harbour. Lieutenant Brooker and Mr. Guy, R.N., are about to proceed to Tasmania, and other parties will follow shortly, so that, if the Colonies will but continue their support, few years will elapse before their coasts and harbours will be completely examined.

British Columbia.—The surveying party under Captain George Richards, in H.M.S. *Plumper*, consisting of Messrs. Bull* and

* Captain Washington regrets to add that this was Mr. Bull's last work. On his return from a fortnight's absence in a boat sounding a bay, the fatigue and exposure proved too great for his constitution, and he died suddenly on the 18th November, 1860, and her Majesty's service was thus deprived of a good officer, a valuable surveyor, and an exemplary man.

Pender, Lieutenant Mayne, and Messrs. Bedwell, Gowlland, and Browning, have, as usual, worked hard during the past season. They have surveyed Johnstone Strait, Jervis Inlet, and Home and Quatsimo sounds, in the course of which they have mapped 1100 miles of coast-line, and sounded thoroughly over an area of 350 miles, and partially over 50 square miles, chiefly between Vancouver Island and the mainland. Lieutenant (now Commander) Mayne also has explored the country between Jervis Inlet and Port Pemberton. The chart of Frazer River and Burrard Inlet, on the scale of one inch, and Nanaimo Harbour and Departure Bay, on the scale of 4 inches, by Captain Richards and his staff, have been published at the Admiralty during the past year. Also a new plan of the harbour of San Francisco, from the United States survey; and five sheets containing 15 plans of San Lorenzo, Santa Cruz, and other small ports on the west coast of South America, by Captain Kellett and Commander Wood.

Newfoundland.—There being no sufficient survey of the coast of Newfoundland, Captain Orlebar, with his assistants Commander Hancock, Messrs. Carey, Clifton, and Des Brisay, has been employed during the past season in examining the south coast of the island, in the course of which they mapped 190 miles of coast, including Burin and Placentia harbours, and sounded over an area of 2700 miles. The charts of the Upper St. Lawrence, from Montreal to Quebec, in 13 sheets, on the scale of 2 inches, and of the harbours of those two cities on the scale of 8 inches, have been published during the past year; and Liscomb, Marie-Joseph, Sheet, and Mushaboon harbours, in Nova Scotia, have also been published.

Bay of Fundy.—Captain Shortland, with his staff, Lieutenant Scott and Messrs. Pike, Searnell, Mourilyan, and Archdeacon, has been chiefly employed at the upper end of the Bay of Fundy, and in the Basin of Mines. In the course of the past season they have examined 60 miles of open coast and 100 miles of river and harbour shores, sounding over an area of 250 square miles. An useful Coasting-chart of these regions has recently been published by the Admiralty, extending from the eastern limits of the Bank of Newfoundland by Halifax to the Delaware. Some charts and plans taken from the admirable United States Coast-survey have also been published during the past year; as Long-Island Sound, leading up to New York, the Chesapeake as far as the survey has been made public, with Norfolk, Charleston, Savannah, and Pensacola harbours.

West Indies.—Mr. Parsons, and his assistants Messrs. W. B. Calver and Clifton, have completed a chart of the Grenadines, and are now at work in the Island of St. Vincent. An important correction in the position of some capes on the north-east coast of Cuba has been made by Commander Hamilton in H.M.S. *Hydra*, by order of Rear-Admiral Sir Alexander Milne, Commander-in-Chief on the West India station. Punta Lucrecia is shown to be in long. $75^{\circ} 40'$ w., instead of long. 76° w., as in many charts, and this correction of 20 miles of longitude gradually decreases east and west till it vanishes at Cape Maysi on the east, and Punta Maternillos on the west. The first volume of the 'West India Pilot,' comprising the coast of the mainland from the Orinoco, round by Yucatan and the Gulf of Mexico to Florida Strait, compiled by Captain Barnett, and revised and completed with a Table of Positions by Mr. James Penn, R.N., of the Hydrographic Office, has just been published at the Admiralty.

Variation.—Researches in the field of magnetism, in connexion with the security of navigation, are still engaging the attention of the Compass Department of the Admiralty. The causes of certain anomalies which existed in the compensation of some iron ships' compasses have been detected by an elaborate series of experiments undertaken by Mr. F. J. O. Evans, R.N., the superintendent, during the past year, and which have been ably investigated by the well-known mathematician, Mr. Archibald Smith of Lincoln's Inn. The combined results have been laid before the Royal Society, and will be doubtless published for the benefit of navigators of all nations. Terrestrial magnetism, in its relation to the progress of navigation, and thus indirectly to the advancement of geography, is a science deserving the cordial assistance of geographers, and we hope to see our travellers, especially when promoting their researches in the remoter regions of the globe, devoting attention to the determination of its elements, in connexion with other objects of inquiry. Observations, chiefly for that primary element to the seaman and the traveller, the variation of the compass, are being made with much assiduity by the officers of the Navy. An elaborate series, by Captain Denham, has been brought up to the present time in H.M.S. *Herald*, from Australia, through the Indian Ocean, by the Cape of Good Hope to England; another series has just been made by Captain Pullen, in H.M.S. *Cyclops*, in the Red Sea, coast of Arabia, Indian Ocean, and Atlantic; and a third series off the west coast of Africa, between the Equator and the Cape of Good Hope, has

been made under the auspices of Rear-Admiral Sir Frederick Grey, late Commander-in-Chief on that station.

Besides the surveys above enumerated, as in progress in different parts of the world, the labours of the Hydrographic Office, during the past year, have consisted in the publication, under the immediate superintendence of Mr. Michael Walker, Assistant-Hydrographer and chief Draughtsman, of about 90 new and corrected charts and plans, some of which have been already mentioned. It is with regret I add that increasing years have deprived the Admiralty of the valuable assistance of Mr. Walker, who, after 50 years of faithful public service, wisely retires into private life to spend the remainder of his days in peace and quietness. Those who can remember the state of our maps and charts half a century ago, will be best able to appreciate the labours of Mr. Walker. As Chief Draughtsman it was his duty to construct charts, often out of conflicting materials, and to reconcile longitudes which even some of our most skilful travellers and surveyors are too apt to leave in a state of uncertainty, as doubtless our excellent fellow-labourer, Mr. John Arrowsmith, would readily bear testimony. During the long period that Mr. Walker held this responsible post he had gained the entire confidence of Captain Hurd, Sir Edward Parry, Admiral W. H. Smyth, Sir Francis Beaufort, and the present Hydrographer, and served his country with a zeal, intelligence, and strict integrity, that cannot be too highly praised. And although he retires from official life, it is to be hoped that we shall long have the benefit of his counsel and co-operation as a Fellow of the Geographical Society, of which he was one of the earliest members.

ORDNANCE SURVEY.—By COLONEL SIR HENRY JAMES.

The progress of the Ordnance Survey in the north of England and in Scotland has been greatly retarded during the last year in consequence of the numerous detailed surveys in the south of England, which have had to be made for the purchase of land and for the laying out of the fortifications for the defence of the Royal arsenals, and upon which upwards of 400 surveyors and draftsmen, brought from the northern parts of the kingdom, have been employed.

The plans of Northumberland and Cumberland, on the 1/100,000 scale, are in course of publication, but, for the reason above stated, these counties will only be finished in about twelve months from the present time.

The plans of Perthshire and Forfarshire are also in course of publication, and the survey of these counties will also be finished about the same time.

England.—Yorkshire and Lancashire are published on the 6-inch scale, and Durham and Westmoreland on the $\frac{1}{112500}$ and 6-inch scales. The surveys made for military purposes at Portsmouth, Plymouth, Chatham, Sheerness, Dover, Pembroke, the environs of London, and several other places, have all been made and published on the same scales as those adopted for the National Survey, and as parts of the counties in which they are situated; should it therefore be decided by Government and Parliament to extend the Cadastral Survey to the south of England, these plans will form integral portions of the complete surveys of the several counties.

Scotland.—These counties have been published on the 6-inch scale:—Edinburgh, Fife, Kinross, Haddington, Kirkcudbright, Wigtou, and Isle of Lewis; and the following on the 6-inch and $\frac{1}{112500}$ scales:—Linlithgow, Lanark, Ayr, Renfrew, Dumfries, Peebles, Selkirk, Roxburg, Berwick, Dumbarton, and Stirling; in fact, the Cadastral Survey of all the south of Scotland is finished.

In *Ireland* every county has been published on the 6-inch scale, and eight of the northern counties, which were not complete in all the details subsequently found necessary for the valuation and registration of property, have been revised and made complete.

The general map of the kingdom on the 1-inch scale has been retarded by the causes already stated, but the whole of *Ireland* has been engraved in outline, and several sheets with the hill-features on them have also been published. In *Scotland* the progress of the 1-inch map proceeds *pari passu* with the survey for the larger scales, the plans being immediately reduced to the 1-inch scale and engraved. In *England*, the whole, with the exception of the five sheets which will include the portions not yet surveyed in Northumberland and Cumberland, have been engraved.

The great *trigonometrical operations* of the survey may be said to be closed, the "principal triangulation," the levelling taken in England and Wales, and in Ireland, have been published, and the levelling taken in Scotland is in the press, and in part printed, and will be published very shortly. The three volumes containing the levelling have indexes showing the lines which have been levelled throughout the kingdom, and along which marks ∇ (a broad arrow with a horizontal line, to mark the exact point to which the levels are

given) have been cut upon permanent objects, such as churches, bridges, &c., for reference. These volumes therefore contain very valuable information for all who are engaged in practical engineering operations, and for many other purposes.

The publication of the principal triangulation, with the figure, dimensions, and mean specific gravity of the earth derived therefrom, has been received in all parts of the world with the highest satisfaction. It has been described as an epoch-marking work in the higher branches of geodesy, and in Russia it has given rise to an interesting and valuable discussion between General Schubert and M. Otto von Struve, in communications to the Academy of Sciences at St. Petersburg, on the importance of making those corrections to the observed latitudes for the local attraction at the trigonometrical stations used in the measurement of arcs of meridian, which were first given in the principal triangulation of this country.

In the principal triangulation the figure and dimensions of the earth have been given as derived from our own measured arc of a meridian, and also as derived from the combined results of all the measured arcs in different parts of the world. In the estimates for the present year the sum of 1000*l.* has been taken to enable the Director of the Ordnance Survey to connect the triangulation of this country with that of Belgium, and with the triangulations of Prussia and Russia through that country. This will furnish the data for the measurement of an arc of parallel from Valentia, in the west of Ireland, to Oursk, on the river Oural, in Russia, of no less than 75 degrees in length, along the parallel of 52°.

This is the greatest geodetic operation that has ever yet been undertaken, or which could before have possibly been undertaken, and the result will put to a severe proof the determination of the figure and dimensions of the earth from the measured arcs of meridians.

From the Topographical Dépôt we have received the map of Montenegro, which has been recently made from the surveys of the Commissioners sent by our Government to mark the boundaries of that country, in conjunction with officers from the Government of Austria.

We have also received several lithographed sketches illustrative of the actions fought in China, and of the route followed by the allied armies in their advance upon Peking.

The accuracy and perfection of the maps reduced by photography at the Ordnance Survey Office is well known to the public, and has been officially reported upon. The method of printing the reduced

maps from zinc or stone, which the Superintendent of the Ordnance Office has named photozincography, has also been brought to great perfection, and promises to be of the greatest value for purposes not originally contemplated, viz., the printing of fac-simile copies of ancient MSS., an example of which has just been published in the copy of the part of Domesday Book relating to Cornwall.

A work on meteorology for observers, and especially for travellers, which should contain precise instructions as to the manner of reading and recording their observations, and with the necessary tables for their correction, has long been a desideratum, and this has now been supplied by the publication, by the Superintendent of the Ordnance Office, of a small work entitled '*Instructions for taking Meteorological Observations*,' &c., which has been adopted as the text-book for the Army Medical Department; all the officers belonging to which, wherever stationed, are now directed to make regular meteorological observations, and whose reports, when properly digested, will probably throw great light on this branch of science. A copy of this work will be found in the Library. The Superintendent has also presented the Society with a copy of his recently published '*Quadrant Atlas*,' containing two maps of the world on his projection of two-thirds of the sphere, and on which the lines of equal magnetic declination are shown, and also four maps of the stars, two for the northern and two for the southern hemisphere, the central meridians being at six hours' intervals. These are circular maps, so folded as to form a quadrant, and are intended for the use of sailors and travellers.

GEOLOGICAL SURVEY OF BRITAIN.

The connexion of the sciences of geology and geography is palpable, and there can be no doubt that every geographical surveyor will give a much truer character to his hills, escarpments, slopes, and valleys if he be well acquainted with their internal structure.

In the last Report presented to Parliament we learn from my explanation as the Director-General of the Geological Survey, that with the view of completing the classification of the older rocks of the British Isles, I was occupied during the last summer, with my associate, Mr. Geikie, in more firmly establishing the views I had before propounded of the existence of a clear ascending series in the crystalline rocks of the Highlands, from vast basement-rocks of gneiss, which are of higher antiquity than any rock in England.

Wales, or Ireland. The feature which renders this older or fundamental gneiss (the Laurentian system of Logan, in Canada) of singular interest to the physical geographer is that whilst its chief masses, as seen in the Lewis and other parts of the Hebrides, are elongated geographically from N.E. to S.W., the range of the strata is from N.W. to S.E., or transverse to the form of the land. A new sketch-map of Scotland, which is about to issue, as based on my original observations in the Highlands, and published in the *Quarterly Journal of the Geological Society*, has been prepared by Mr. Geikie, and in it will be shown for the first time that the upper portion of the crystalline rocks of the Highlands is the altered representative of the Lower Silurian rocks of the south of Scotland.

In the extension of the Geological Survey of England from the south to the north of England and Scotland, the insertion on the maps of the 6-inch scale of the subterranean knowledge obtained, is in no respect more interesting than in the correct delineation of the various altitudes to which the shore-deposits of antecedent periods have been carried up above the present sea-level. This is particularly conspicuous on all those sheets on which the contour lines have been laid down. It is out of place here to enter into details of the progress of this survey, so important in developing the mineral wealth of Britain; but it is gratifying to be able to state that the public are taking so much interest in the subject, that they now purchase threefold the number of geological maps which they did two years ago. It would, indeed, be strange if such a result had not followed the labours of those who are continuously occupied in unfolding the mineral resources of their country.

Although Colonel (now Sir Henry) James, who so ably superintends the Topographical Survey, gave evidence 5 years since before a Committee of the House of Commons that in ten years the whole map of Scotland would be completed, it is, alas! now too probable that a very long period may elapse before North Britain will possess such a general geographical map as is already possessed by France and Germany. But this lamentable state of things is in nowise to be laid to the charge of the Map Office and its able superintendent, but is mainly due to the oscillation in the views of different Governments, and the sudden diminution this year of the Parliamentary grants (see also p. cxlvi), coupled no doubt with an unwillingness to grant large sums for surveys on that stupendous scale, which, according to the mode adopted by the Map Office, were to serve as the basis

for the construction of a *real map* on the 1-inch scale. It is for the latter or only manageable map that we, as geographers, have been calling out for thirty years, or ever since this Society was founded.

PROGRESS IN METEOROLOGY. By ADMIRAL FITZROY.*

Meteorology is not a science in which much progress can be made in so short a time as that which elapses between our Annual Reports. Nevertheless, since the last Anniversary Address from this chair, remarkable steps have been taken by Government tending to utilise this branch of knowledge in a general and important manner.

In 1857 it was arranged that simultaneous observations should be made daily at a large number of selected stations in the British Isles, in and around the Atlantic, and at places on the European continental coasts. By combining these observations in synchronous charts, and otherwise, it was seen that, irregular as changes of wind and weather seem to our usual apprehension, there is really so much uniformity and similarity of character in successive variations, that by means of a comparatively small number of observations, made daily at a few selected stations sufficiently far apart, and by the use of an "atmoscope" (or self-registering barometer) at a central station, to which meteorological telegrams may be sent from the other outlying stations; it was seen that by such means a distinct intimation of marked changes of weather, and warning of dangerous storms, might be given at the centre, and thence to all other points of any telegraphic combination.

The idea of giving warnings of storms, by telegraph, was familiar to many meteorological observers—in America as well as in Europe. It was suggested before the year 1836, with a reference alone to the semaphoric telegraph, but directly electricity was made man's messenger, its applicability to this object occurred immediately. Yet the subject attracted too little popular interest to be taken up by any influential body until in September 1859, at Aberdeen, the British Association resolved to express to Government their view of its importance. The Prince Consort, then President of the British Association, directed steps to be taken. Communications were made to the Board of Trade. The Treasury and the Admiralty were consulted, and the result was the establishment of a system, experimentally, by means of which it is hoped that much

* Director of the Meteorological Department, Board of Trade.

loss of valuable property, and a much more serious loss of *invaluable* lives may be prevented. This system, known through the newspapers, was commenced last September. Until January it was limited to receiving reports from practising observers.

Memorandum on Storm Warning Signals.

A staff and two canvas shapes being provided, the following use will be made of them occasionally, perhaps once or twice in a month:—

One shape, that of a drum (or cylinder), has the appearance of a black square of three feet (seen from any point of view), when suspended.

The other shape, a cone three feet high, appears triangular (from any point of view), when suspended.

A cone with the point upwards shows that a gale is *probable* from the northward.

A cone with the point downwards shows that a gale is *probable* from the southward.

A drum, alone, shows that dangerous winds may be expected from nearly opposite quarters successively.

A cone and drum give warning of dangerous wind, its probable *first* direction being shown by the position of the cone; point up and above the drum for polar or northerly wind—down and below for southerly.

Whenever such a signal is shown (in consequence of a telegram from London), it will be kept up—shown distinctly—till dusk of *that day only*, unless otherwise instructed afterwards.

These cautionary or warning signals advert to winds during part of the next following two or three days; and, therefore, due vigilance should prevail from the *beginning* of such time until the weather is again finally settled.

No further steps are necessary for these objects at the telegraph-stations for the present. Other organization may follow when the coast-guard have prepared arrangements for repeating these signals along the coast to certain distances.

A conspicuous place should be selected for signalling, near the telegraph-station.

If conveniently practicable, the signal pole or staff should be in view of some seafaring persons and of the nearest coast-guard.

When both these objects cannot be conveniently attained without too great distance from the telegraph-station, one only—that of visibility to some of the seafaring community—should be secured.

In this case a message should be sent to the nearest coast-guard, and charged at the Company's tariff.

Further local notice will be given, it is hoped confidentially, by *local interests* and *authorities*. London can warn the outports. The coast-guard may repeat the warning as far as means allow, and completion of such cautionary notices may be effected by *private* assistance along the most frequented shores.

It should be remembered that only the greater and more general disturbances of the atmosphere are to be made known by this method (warning signals), not merely local or sudden changes (however violent or dangerous), which are not felt at a certain distance, and do not therefore affect other localities. Such changes are indicated to observers at these places by their own instruments, by signs of the weather, and by consideration of the weather reports for a few previous days.

Much inequality of atmospheric pressure or temperature, great depression or elevation of the barometer, sudden or rapid alterations, great falls of rain or snow, indicate more or less change, more or less wind, with its usual accompaniments, either in some places only or throughout an extensive area of hundreds of miles, if not thousands.

Speaking generally, there is far less occasion to give warning of *southerly* storms by signal than of northerly, because those from the southward are preceded by notable signs in the atmosphere, by a falling barometer, and by a temperature higher than usual at the season; whereas, on the contrary, dangerous storms from a polar quarter (N.W. to N.E.) are sometimes sudden and usually are preceded by a *rising* barometer, which often misleads uninformed persons, especially if accompanied by a temporary lull of perhaps a day or two, with an appearance of fine weather.

On the 6th of February the first warnings were given, on the foregoing principle, after which eight other warnings followed between that date and March 19th; since when, no general or remarkably windy atmospheric disturbance has occurred.

The warning of February 6th was disregarded at Shields by a fleet of vessels, and many were wrecked on the 8th or 9th.

Subsequently, whether from having appreciated these storm-signals, or from some other reasons, the *fact is* that very few, if any, wrecks occurred *on our* coasts during all the notoriously tempestuous weather of last February and March.

It is well known that M. Leverrier and numerous scientific authorities on the Continent, especially M. Buys Ballot in Holland, have for some time had their attention directed to simultaneous meteorological observations, and their utilisation for maritime, commercial, and geographical interests.

But the range of M. Buys Ballot's stations is small, and, on the other hand, that of M. Leverrier is so extensive that great difficulty has hitherto been found in grouping, combining, and concluding from them for practical use.

M. Leverrier's letter to his British colleague at Greenwich, in April 1860, arrived opportunely at the time our Government had under consideration these suggestions of the British Association (which originated at Aberdeen) and, undoubtedly, had the weight due to such an authority as himself.

The British Islands have very peculiar facilities for meteorological communication by telegraph between outlying stations, on the sea-coast, and a central place—all at nearly the same level, and all similarly uninfluenced by mountain ranges, which are well known to alter or impede the horizontal movements of atmospheric currents. Great distinctions should be marked between those ever alternate, often conflicting *main* currents, tropical and polar, and the *local effects* of their union or antagonism—namely, mixed winds, whether westerly or easterly, with occasional cyclones or circulating eddies on a large or small scale.*

During the month of April this year, and to this time,† a polar current, very extensive and uniform, has swept or flowed *near* or along the surface of our islands and adjacent area, while its counter or *super* current has moved in a more or less contrary direction, usually above, but at times intermixing with, and often affecting

* See last Report, Royal Geog. Soc., 1860.

† 13th May, 1861.

or influencing the lower and normal "*abpolar*" movement by here and there pushing down and onwards. Considering that the lower current does not extend very far upwards (only a few thousand feet) and that high land mountains, and especially ranges of mountains alter or impede its progress, a variety of eddy winds, or, as it were, streams, with local and apparently anomalous effects, must be frequently caused.

Electrical action, condensation of vapour in hail, snow, rain or fog, or its other changes—namely, evaporation, rarefaction and expansion—absorbing heat and therefore causing cold, immediately affect currents of air in a degree proportional to their influence.

The polar current always *advances* direct from the northward toward the southward, or the south-westerly quarter, while *laterally* moving eastward (like a ship making leeway), pressed toward the east by the tropical flow which advances from the south-westward, usually above, and at an angle with the polar stream or current of air, often mixing with it but, at times, separately sweeping and warming the earth's surface, uncombined with the polar current, even while feeling its approaching influence, and, as it were, forcing a passage between streams of the chilling polar air, that at the same time are moving in opposite, and nearly parallel or slightly angular directions.

Sometimes their opposition is so equal, and equilibrium is so complete, that a calm is the result, and then there is no sensible movement horizontally along the earth's surface.

The "*atmoscope*" is found to be an exceedingly useful instrument. It was invented by Admiral Milne, and, though considerably modified, as its use has suggested, in principle it is the same as his self-registering barometer. It shows the alterations in pressure, or the pulsations, so to speak, of atmosphere, on a large scale, by four hourly marks; and the diagram expresses, to a practised observer, what the indicator-card of a steam cylinder shows to a skilful engineer, or a stethoscope to a physician. It may trace its curve, hourly if required, by night and day, for a week or more.

For *travellers*, attention should be drawn to improved aneroids, some on more correct principles of construction, some much smaller than previous to the expiration of the French patent (taken out by their ingenious inventor, M. Vidi); others very suitable for measuring heights not exceeding about 4000 feet.

New constructions of mountain mercurial barometers have been lately suggested, but not proved yet by practical use. Perhaps it

will be difficult to devise a better one than that of Gay Lussac, if made stronger, with the glassblower's work better executed, than has been the case with some that have been found too delicate for mountain ascents.

Travellers should not be influenced, in such cases, by the very precise refinement desirable in an instrument for the observatory (to which superlativeness many an opportunity of observation, with sufficient accuracy, has been sacrificed by accidents in travelling), but should endeavour to secure a reliable, though less minutely accurate means of ensuring results, within *known limits* of moderate error. A tenth of an inch alteration in the Torricellian column is caused by nearly 100 feet of change in elevation. What is this compared with some 20,000 feet, and the yet little known atmospheric influences at such a height, where the mercury falls to about 12 inches? And yet to attain a nicety of measurement, to the thousandth of an inch, instruments are offered to zealous travellers or voyagers, suitable only for use at convenient stations. This defect, if it may be so called (though really an excess of goodness in one direction), has been too general in marine barometers, also, of late years: excellently made, admirable in principle respecting accuracy and permanent reliability, but too finely graduated for an ordinary observer at sea, or by night, and too delicate in structure to bear the common shocks unavoidable in a ship of war. These objections have been lately obviated by a less minute graduation on a porcelain, instead of a metal scale (liable to tarnish or rust), and by "packing" the glass-tube with vulcanised India-rubber. Thus constructed, the accuracy and reliability of a Kew model marine-barometer is obtained, to the nearest hundredth of an inch, having the quality of withstanding even heavy gunfire (as proved on board H.M.S. *Excellent*), and a facility for adapting spare portable tubes, boiled and fixed in their cisterns, capable of adjustment to any similar barometer, *without the aid of an optician*.

In using these invaluable instruments (which some voyagers would rather have than a chronometer, though one costs three pounds and the other about forty), it is well to have some definite idea of the amount of change which indicates unusually violent wind, such as the *St. Kilda* cyclone of October, 1860, the *Camilla* typhoon of the same time nearly, and the *Royal Charter* gale of October, 1859. In each of those very similar storms the barometer fell at the rate of a tenth of an inch an hour before the shift of wind occurred, before which it ceased falling, then began to rise,

and while the violence of the tempest prevailed, rose as rapidly as it had previously fallen.

Generally speaking, and adverting to *numerous other instances*, sudden changes at the rate (nearly) of a tenth of an inch in one hour, are indicative of immediate and great atmospheric commotion. On the other hand, when the column does *not* rise or fall rapidly, that is to say, at an hourly rate of about the hundredth of an inch or less, any change of wind or weather of an extensive or general nature, however remarkable it may be, if the movement continue *long*, will be gradual and lasting.

RECENT GEOGRAPHICAL PUBLICATIONS IN EUROPE.

Britain.—The Royal Atlas of Geography, which has now reached an advanced state, as published by Mr. A. Keith Johnston is, as might be supposed from the accurate knowledge of the author, and his perspicuous method of applying it, a most desirable addition to our works. The clearness of the coast lines and river drainage, as defined in blue tints, is particularly to be commended. This Royal Atlas, of which eight Parts are already issued, is to be completed in ten Parts; and, in approving the execution of the maps, we cannot avoid calling special attention to the tabular and alphabetical lists of names of places, and the good arrangement by which the position of any place is at once found upon the map.

In addition to his other maps, Mr. Keith Johnston is about to publish a new Geological Sketch-Map of Scotland, by Sir Roderick Murchison and Mr. Geikie, which is alluded to in the account of the progress of the Geological Survey.

The Rev. A. Mackay, a minister of the Free Church of Scotland, and resident at Rhynie, in Aberdeenshire, who is a Fellow of our Society, has in the last year brought out a Geological Manual, which does him great credit. For, when we reflect on the difficulties under which a pastor who is most zealous in the performance of his clerical duties, in a remote and inland tract of Aberdeenshire, must labour, and who, in the employment of his leisure hours, has compiled this work, we must admire the ability and persevering research with which he has succeeded in imparting to his Manual so much freshness and originality. In no respect is this character more apparent than in the plan of arrangement by which the author commences his description of the physical geography of each tract by a sketch of its true basis or geological

structure. The work is largely sold in Scotland, but has not been sufficiently spoken of in England. It is, indeed, a most useful school-book in opening out geographical knowledge.

'*What to Observe, or the Traveller's Remembrancer.*' The sale of the two former editions of Colonel Jackson's most useful book having rendered the publication of a new edition necessary, it was entrusted to Dr. Norton Shaw, and has been lately issued under his revision. The work contains a quantity of new matter, greatly compressed, in which the assistance of our well-known scientific geographers, Admirals Smyth and Beechy, Sir George Everest, Sir Gardner Wilkinson, Capt. Blackwood, &c., are duly recorded.

Germany.—The country which gave birth to a Humboldt and a Ritter may well be proud of the efforts which are made to do honour to the memory of these illustrious geographers, by the establishment of foundations under their respective names, by which researches in distant lands are to be aided and encouraged. We trust that, with such an eminent African explorer as Dr. Barth, resident in Berlin, and with the knowledge we possess of his powers of writing on geographical subjects, the loss of Karl Ritter may be not inadequately supplied.

The well-deserved success of that admirable periodical, the '*Mittheilungen*,' of Justus Perthes and Co., as edited by M. Petermann, is a satisfactory proof of the profound interest taken by our German contemporaries in every branch of geographical inquiry. Referring to that work for many valuable details, and most clear and accurate analyses of maps and volumes which are constantly issuing from the continental press, it is a satisfaction to us to see how through the pages of the '*Mittheilungen*' the public in Germany are regularly and promptly made acquainted with all the most important of our British explorations.

Among the publications which are issuing from the press of Austria it is incumbent on us to notice with full approbation the narrative of the Circumnavigation of the Globe, by the frigate *Novara*, in the years 1857-8-9. Commanded by Commodore von Wüllerstorff-Urbair, the description of the voyage has fortunately fallen to the lot of Dr. Karl Scherzer, one of the scientific members of the expedition, who has executed his task with great ability. Already an English edition of the first volume has appeared. The physical and geognostic suggestions which were written out by Humboldt for the guidance of the scientific inquiries of the voyagers, and which are prefixed to the narrative, are full of that

love of nature which, to the last, animated the great and illustrious traveller.

In the volume which is to follow we shall doubtless have good descriptions of the natural history of the regions visited, for, as respects the geological structure of some of those tracts, Dr. Hochstetter has already published excellent detached notices.

The woodcuts, as executed at Vienna, and which are spread throughout the first volume, are of first-rate excellence.

Switzerland.—Our learned and indefatigable correspondent, M. Ziegler, informs us, that the Great Federal map of Switzerland approaches to its completion. Sheet No. 22 is engraved and will shortly be issued; portions of sheets Nos. 8, 13, and 23 remain to be surveyed and engraved; of sheet No. 8 a small portion in the s.w. part remains to be engraved; of sheet No. 13, about one-fourth is engraved, one-half drawn, and the rest in various patches remain to be surveyed; of sheet No. 23 the s.w. part in the vicinity of Monte Rosa remains to be surveyed; about three-fourths are engraved. The Federal Council have ordered that a reduction of this great map be made on a scale of $\frac{1}{100,000}$ or about $\frac{1}{4}$ of an inch to the mile, and engraved on 4 sheets; the s.e. sheet is engraved, and the other sheets are rapidly progressing to the same state as the larger map.

The progress of the geological map of Switzerland has been assisted by a small contribution from the Swiss Government; the limited means at the disposal of the Helvetic Society being hardly sufficient to defray the expenses of the work. The Society have selected the following Members as Directors of the Swiss Geological Map, viz.:—Professor B. Studer, of Berne; Professor P. Meiran, of Basle; Professor A. Escher von der Liuse, of Zürich; Professor E. Desor, of Neuchâtel; Professor A. Favre, of Geneva.

Professors B. Studer and Escher are preparing a new edition of their geological map of Switzerland, which must suffice for a time until larger financial support enables them to complete their detail maps. Professor A. Favre, after twenty years' labour, is about to publish at Geneva his geological map of Savoy, having declined the invitation to publish it at Paris.

Professor M. E. Plantamour, of Geneva, has made some valuable hypsometrical observations relative to the Great St. Bernard, taken from his observatory at Geneva; the observations were made at two-hour intervals, and the result shows the effects of the change of temperature through the day. The reading at 6 A.M. was 2061.32", at noon 2092.95", and at 10 P.M. 2062.97", showing that

the greatest difference takes place at the moment of the intensest insolation.

Dr. L. Lavizzari has produced five books on his excursions into the canton of Ticino, giving a geographical, statistical, and historical description of that mountainous canton. As President of the Society of Naturalists, the same author has presented his colleges with numerous papers relating to various subjects, and a map resulting from his examination of the levels of Lake Lugano.

Professor Thury has published an interesting paper on the Glaciers, considered as the natural ice-reservoirs of Switzerland. In 1727 the Duke of Lévi caused the Glacier de Baume, near Besanger, to be emptied, and in the space of sixteen years it was found completely replenished with ice; the principal agents in the formation of new ice appear to be the sudden changes of temperature, caused by evaporation and currents of air, during the spring of the year, after the slow influence of summer warmth has dissolved the old ice.

Let me add here that in the last edition of the 'Encyclopædia Britannica' (just published) will be found an excellent summary on Switzerland, which has been highly praised by no less an authority than our learned Associate, Professor Paul Chaix of Geneva.

*Russia.**—Russia has always claimed our special attention, and our Presidents have always considered it an important duty to place before the Society a sketch of the Researches of Russian Geographers during the past year, which, being published in a language very little known, are accessible to but few of our members.

The *Compte-Rendu* of the proceedings of the Imperial Society, during the year 1860, is indeed already before the public in the French language, and does great credit to the Secretary, M. de Thörner, who has prepared it. For, as the detailed descriptions of the countries examined are published in the Russian language, this resumé of the proceedings of our old allies is really most important. Established, as this Imperial Society was, on the same basis as our own body, the Secretary commences, as we do, their last year's Report with sketches of the lives of the recently deceased geographers of Russia. M. A. Savelief, M. P. Kalaykof, and General Tanner, are spoken of in terms of well-merited praise. The last of these is indeed one of those eminent practical geographers whose labours have been before enlarged upon by Sir R. Murchison, and

* Thomas Michell, Esq., F.R.G.S.

whose measurement of the great Russian arc of the meridian, in conjunction with Struve, has rendered his name famous for all time among geographers.

The attention of Russian geographers has recently been much divided between the country of the Amûr, definitively ceded to Russia by General Ignatief's treaty, and those regions of Central Asia which Russia has been so long engaged in exploring.

English geographers have already been informed that a scientific expedition was despatched to the Amûr, under the auspices of the Imperial Geographical Society. Mr. Schmidt, the chief of the geological section of that expedition, made some very important observations during a voyage from the new town of Blagovestehensk, at the mouth of the Zoya River, to the port of Nicolaefsk, at the mouth of the Amûr. He denies the existence of volcanic rocks reported by other travellers, and found nothing but sedimentary deposits.

Early in June of last year Mr. Schmidt visited the island of Sahalin, held jointly by Russia and Japan, though virtually, and notwithstanding the treaty of Simoda (1855), in the sole possession of Russia. On landing Mr. Schmidt at once recognised the rocks of the banks of the Amûr as belonging to the carboniferous formation which prevails in the island, as well as in the basin of the Amûr. Mr. Schmidt has been authorised by the Imperial Geographical Society to devote the whole of this summer to the exploration of the island of Sahalin.

The expedition will return to St. Petersburg in the autumn of 1862, after passing the summer of that year in a minute exploration of the Amûr basin. Two assistants have been sent out to Mr. Schmidt; Mr. Glehn, who replaced Baron Maidel, and Mr. Brylkine, despatched by the Siberian Section of the Geographical Society; the latter being a gentleman well known as an explorer of the rivers Ussuri and Amûr.

Mr. Schwarz, the chief astronomer of the Mathematical Section of the Amûr expedition, is busily completing his calculations, and his assistant, Captain Rajkof, whose name already appears in our Transactions, has been thanked by the Council of the Imperial Geographical Society for the remarkable manner in which he has fulfilled the various duties with which he was entrusted.

The Imperial Geographical Society is now engaged in preparing a map of Eastern Siberia, compiled principally by M. Schwarz, including a portion of the Trans-Baikal country, the government

of Irkutsk, and a part of that of Yeniseisk, also in compiling an account of the labours of the Siberian expedition, and a work on the meteorological data now collected by the latter.

We cannot but appreciate the indefatigable exertions of the geographers of Russia in throwing the light of science over such a vast country, and we should indeed be sorry if so much labour, so many hardships and privations, and so much money, were not required by some of the material advantages at first expected, though as yet but little realized.

The geography of Central Asia has been enriched by several communications by Fellows of the Imperial Geographical Society of Russia, travellers in that interesting country.

Mr. L. Vennikof, one of the best modern authorities on the countries adjoining the south-eastern frontier of Russia, read a memoir in October last on the lake of Issyk-kul, from which he had just returned. After giving a short account of the topographical labours of his expedition on that lake and at the Kashkar River, and pointing out the valuable additions thereby made to the works of Nifantief, Kiepert, Semenof, and Zakharof, Mr. Vennikof entered into some particulars respecting the lake Issyk-kul and its immediate neighbourhood. His attention was more particularly directed towards the south-west part of the lake, and the valley of the Kashkar, a portion of the country which had never yet been explored by scientific travellers. This gentleman has, to a great extent, dissipated the illusions hitherto entertained by some persons in Russia as to the great fertility of the country in the vicinity of the Ili River, and its adaptability to cultivation, and especially in reference to colonization. He also gave a very interesting description of the Kutemaldy River, uniting the river Chu, which forms to some extent the boundary of Russia, with the lake of Issyk-kul. His researches at the source of the Chu afford much valuable information. The Kashkar rises in the Celestial or Tianshan Mountains, and flows through a natural pass in that chain, issuing from gorges which terminate in the valley of the Naryn and at the Alpine Lake of Son-kul, hitherto but vaguely known to geographers. Mr. Vennikof has further contributed some observations on the Sary-Baguiche tribe inhabiting that part of Central Asia.

Mr. Kuléwein, who accompanied General Ignatief in his late mission to Khiva and Bukhara, has given an account of his journey, which will be published in the Journal of the Geographical Society of Russia. He describes the Khanat of Khiva as it was under the

administration of Seid-Mohammed-Khan (1856-1860), and traces the journey of the mission across the steppe of Orenburg, along the western shore of the Sea of Aral, as far as the lake of Aiboughir; the passage over that lake near the promontory of Urga, the arrival of the mission at Kungrad on the Amu or Oxus, and a voyage of 18 days on that river, in native boats, as far as Khiva. Mr. Kuléwein proceeds to describe an audience of the Khan Seid-Mohammed, the administration of that chief, and the events which preceded his election, and to throw some light on the relations which then existed between Russia and that Khanat. Much valuable information has been obtained respecting the rising of the Turcomans, with whom Persia is now at war, the revolt of Kungrad, and the election of Mahommed-Fannah. As soon as Mr. Kulléwein's memoir appears in print many of us will, no doubt, eagerly apply to it for information regarding the limits of the Khanat of Khiva, its population, agriculture, and commerce, subjects which are extremely well treated by this able diplomatist. M. Kuléwein has presented to the Imperial Geographical Society photographic sketches of the country, and its native types, as well as of the coins in circulation in Khiva and Bukhara.

The explorations of a party sent by Dr. Bergstreusser to inquire into the practicability of uniting the Caspian with the Sea of Azof, and which were mentioned in the Address of last year, having resulted in a very favourable description of the country, and of the facilities which it afforded for colonization, the minister of the Crown domains of Russia despatched another expedition with the view of exploring scientifically the low valleys of the Kuma and Manyeh, and the Kalmuck steppe, which extends between the Don and the Volga. Instead of finding a navigable stream, the exploring party walked dry-shod along the so-called valley of the Manyeh from the Mojer salt-works, 60 miles from the Caspian to the very course of the Don. At the cost of great fatigue and many hardships this party ascertained that the Manyeh is nothing but a channel or bed eroded by the waters of spring, watered during a very short period of the year, and then left dry with a few intervening lakes or pools. Moreover the saline properties of the soil preclude all possibility of peopling these solitudes; and the absence of any population, added to the difficulty of collecting and retaining the spring waters in artificial reservoirs, are obstacles which can never be surmounted.

The geological researches of M. Barbet de Marney, a member of

that expedition, have proved that the existence of the strait which united the Caspian with the Black and Azof seas, can only be referred to a period beyond the reach of history, and that its disappearance is to be attributed to that upheaval of the soil which produced the low country of the Manych, the country of the Cossacks of the Black Sea, and raised up the steppe limestone of the Kuma and Volga, or country of the Don Cossacks. The examination of a canal would therefore necessitate the removal of those obstacles which the powerful hand of nature has placed between the two seas.

The officers of the Russian Surveying Expedition in the Caspian were enabled during the course of last summer to make a geodesical measurement of the peak of Demavend from two astronomical points, namely, from great Ashur Island, in Astrabad Bay, a Russian naval station, and from the mouth of the Tedjen River, near Ferahabad, about 40 miles to the west of Ashur. The geographical position of those two points was determined astronomically, and by means of 17 chronometers used in the Caspian survey. The azimuths of the hill were determined at the two stations by one of Repsold's circles. The measurement from Ashur Island gave 18,551·0 Russian (or English) feet, above the level of the Caspian, and that from the point near Ferahabad 18,547·5; the mean altitude being 18,549·2 feet.

These measurements were apparently made with great care, and Captain Ivastchinzof, the chief of the expedition, is persuaded that, even under the most unfavourable circumstances, the altitude thus obtained must be quite within, at most, 130 feet of the truth.

It will be recollected that Mr. Thomson, Lord H. Schomburg Kerr, and Mr. St. Quentin, estimated the height of Demavend at 20,192 feet; and that Baron Minutoli and Dr. Burgsch, who, in July, 1860, likewise measured it by means of barometers, give figures almost similar, viz., 19,000 to 20,000 French feet.

The Surveying Expedition will probably have several other opportunities of measuring the height of Demavend. Captain Ivastchinzof expresses a wish that a similar measurement should be made from the Persian Gulf by means of stations, an undertaking which would decide the interesting question of a difference in level between the Caspian Sea and the Persian Gulf.

An article on the measurement of Demavend is contained in the '*Morskoi Sbornik*,' or Naval Magazine, for the month of April, a work in the Russian language which is regularly received at the Hydrographic Department of the Admiralty.

While on the subject of mathematical geography attention must be directed to the proposal of Mr. K. Struve, Director of the Nicholas Observatory, at Pulkova, to effect a vast measurement of a meridional arc passing by the 52° of latitude, to extend from Valentia in Ireland,* across the whole of Europe, to the fortress of Orsk, situated on the confines of the Government of Orenburg, and to embrace, therefore, 69 degrees of longitude. Last year Mr. Otto Struve was commissioned by the Russian Government to enter into communication on this subject with the Governments of Prussia, Belgium, France, and England; in each of which countries the project was most favourably received. Forty of the degrees of longitude to be embraced in this measurement belong to Russia, 12 to Prussia, 4 to Belgium, 2 to France, and 10 to Great Britain. It is also proposed to measure two other meridional arcs on the 47° of latitude as a means of checking the other operation: the first extending over 13 degrees in France, and the second over 20 degrees in Russia, from Kisheneff to Astrakhan. Thanks to the careful triangulations already effected all over Europe, this gigantic work may be completed in the course of a few years. The necessary preparations are already being made in Russia and elsewhere.

Great as the activity of the Imperial Geographical Society of Russia would appear to have been, even from this imperfect sketch of its labours during the past year, a considerable portion of the attention of that industrious body has been devoted to statistics and political economy; branches of learning which belong to a distinct section of the Imperial Geographical Society. In the absence of a special Statistical Society at St. Petersburg, it is obvious that the labours of that section must be of immense advantage to Russia at a moment when the development of her vital resources is receiving the most serious attention of all classes, under the philanthropic inspiration and guidance of an enlightened Monarch.

Although not within the strict province of geography the very interesting labours of the Political Economy Committee of the Geographical Society of Russia must be noticed. This committee has held several meetings during the last winter, attended by some of the most enlightened men in Russia, including His Imperial Highness the Grand Duke Constantine, who, by taking an active part in the proceedings, has proved himself a real friend to the intellectual progress of his country.

* See page cxlviii of this Address.

This committee have had under consideration the causes of the financial difficulties of Russia, the recent stagnation in the trade of that country, the colonization of the Amur and Central Asia, the emancipation of the serfs (as a "*fait accompli*"), and the subject of an international decimal system of measures, weights, and coins.

Lastly, it must be stated, that under the auspices of the Imperial Geographical Society of Russia, all those important resolutions were carried by powerful majorities of the committee in a truly liberal spirit, and in consonance with the doctrines of Adam Smith, J. Stuart Mill, and other economists, of whose principles England has so long been the practical exponent.

HINDUSTAN, SIAM, BURMAH, CHINA, AND JAPAN.—By
J. CRAWFORD, Esq.

On the subject of India Proper or Hindustan no communications have been made to the Society, but the name suggests a duty which has often fallen to former Presidents, of referring to the triumphant scientific career of Sir Andrew Scott Waugh, late Surveyor-General of India, now happily returned to his native country, after the active service of two-and thirty years. As the worthy successor of Lambton and Everest, Colonel Waugh brought to a conclusion the great achievement of the Trigonometrical Survey of India. The value of his services may be judged by the single fact, that in seventeen years' time he executed the triangulation of 316,000 square miles, an area nearly equal to the united areas of France and Spain, while he effected the topographical survey of 94,000 square miles, but little short of the surface of the British Islands. Colonel Waugh's operations were sometimes carried on at an elevation of 20,000 feet above the level of the sea, and sometimes over swamps almost on the sea-level; the air, from its rarity, difficult to breathe in the first case, and, from its deleterious quality, dangerous in the last. The combination of high qualities necessary to conquer these difficulties may readily be imagined, and they met in the person of the late Surveyor-General of India, now Sir Andrew Waugh.

Respecting Persia, the only contribution we have during the season, is the Narrative of a Journey across the Eastern Frontier of that country to Afghanistan, by Captain Claude Clerk. The journey extended from Meshed to Herat, a country seldom visited by Europeans. It embraces a portion of the great Salt Desert of Khorassan, a tract of small fertility and greatly infested by predatory hordes of Turcomans.

On the subject of the little known but vast region which lies between India and China, we have had several interesting and instructive communications. Captain Sprye and Dr. McCosh furnished to the Society elaborate Papers respecting the countries which lie between the British frontiers, respectively, of Bengal and Pegu and the Western confines of China, suggesting routes for the establishment in this direction of a commercial intercourse with the Chinese empire. It is only necessary to say that the subject gave rise to a lively and interesting discussion at the meeting at which the Papers were read.

On the kingdom of Siam we have had two valuable communications, both from Sir Robert Schomburgk, her Majesty's consul. These are narratives of his own journeys over parts of the kingdom seldom if ever visited by intelligent Europeans. Siam, after being for a century and a half almost as much excluded from European intercourse as Japan itself, has of late years, chiefly owing to the enlightened character of its present sovereign and the large commerce which has resulted from it, become an object of interest and importance to all the European nations, and more especially to ourselves.

The great Asiatic Archipelago, including the Malay and Philippine Islands, has been brought under the notice of the Society by two original and valuable Papers, describing portions of them hitherto little or very imperfectly known. One of these, by Mr. Spencer St. John, her Majesty's Consul-General in Borneo, gives an elaborate account of the physical and political geography of the north-eastern portion of the great island of Borneo. The other is by the eminent naturalist, Mr. Alfred B. Wallace, and gives by far the completest account hitherto rendered of the trade of New Guinea and the adjacent islands inhabited by the Papuas or Oriental Negroes. The importance of the great archipelago in question may be judged by the facts, that its population is computed at not less than twenty-five millions, while its external commerce, as conducted by the Dutch Spaniards and ourselves, is of the yearly value of thirty-six millions sterling.

Several interesting contributions to our knowledge of the vast empire of China have been made during the season. Thus, we have had an account of the survey of the Si-kiang, or Western River, by Lieutenant Lindsay Brine, R.N., while her Majesty's Ministers have supplied us with the Admiralty directions for the navigation of the rivers Si-kiang, Yang-tse-kiang, and Pei-ho,

with that of the Gulf of Pechili. It may here be mentioned that, for the prosecution of geographical knowledge, two expeditions are at present in progress; the one from the British territory in India into Chinese Tartary, and the other into the north and western provinces of China, passing from the eastern side of China by the Great River into the provinces in question, and from them into Tibet, ending with the neighbouring British Indian territory.

It would be superfluous in this place to expatiate on the importance of China to our own well-being, but a few facts may be noted, which are both striking and illustrative. The joint amount of our own trade, export and import, amounts to 14,000,000*l.* a-year, exclusive of the trade with our Indian possessions. This trade is furnishing us with 76 millions of pounds yearly of a commodity—tea—which no other country can supply, and without which we could not, from long habit, live comfortably. Through that commodity, from five to six millions sterling are placed in the public treasury. China pays a yearly tribute to India of not less than five millions, without which our Indian dominions could not be conveniently held. And, finally, it contributes one-half of the raw material of one of our great manufactures, silk, which is even more than Australia does for the woollen manufacture, great as is its assistance.

The empire of Japan, with its singular population, equal at least in number to that of our own island, and, among Asiatic nations, second only to China in civilization, is now fairly open to us, after an almost total isolation of two centuries; the unquestionable work of steam navigation. On this interesting and important country we have valuable and original communications. One of these is by our able and experienced minister, Mr. Rutherford Alcock, describing a journey into the interior of the main island, Nippon, and another to the Sacred Mountain Fusi-yama, which may be called the Olympus of the Greeks or the Meru of the Hindus. The second communication is by Mr. Pemberton Hodson, her Majesty's consul at Hakodadi, the chief town and port of the Island of Yesso, a conquest of the Japanese made within the last three centuries, and whose native population, its Japanese inhabitants being but colonists, consist of a distinct and peculiar race. It is satisfactory to think that already the trade of Japan holds out good promise, for we find that in the course of last year we received from it no less than 7000 bales of raw silk, being three times the quantity which China furnished forty years ago, the quality being equal to the best Indian.

ARCTIC REGIONS.—By Captain RICHARD COLLINSON.

There are at present two expeditions occupied in attempts to reach the Pole. One, under Dr. Hayes, sailed from Boston on July 10th, 1860, in a vessel of 140 tons, called the *United States*, and arrived at Upernavik on August 12th. Here he obtained dogs and furs, and an interpreter named Mr. Peter Johnson. The last accounts from him are dated Tessinsak, August 23rd: he hopes to reach Cape Frazer, in lat. $79^{\circ} 42'$, on the east side of Peabody Bay, where he intends to establish his winter-quarters, and then pursue his explorations northerly along the shore of Grinnell Land.*

The second expedition, under Dr. Forell, with several volunteers of education, assembled in April at Tromsøe where they would be joined by Petersen, who carries up with him 20 cases of pemmican remaining from the store of that article supplied by our Government to the *Fox*. They then proceed to Spitzbergen, where they will winter, and follow Parry's route to the northward. These two expeditions will, in all probability, settle the question of an open sea in the vicinity of the Pole, and afford meteorological and tidal observations of great importance in high latitudes.

Renewed search for the *Erebus* and *Terror*.—Mr. Hall, a native of Cincinnati, has started in a whaler called the *George Henry*, on board which vessel he intends to winter in Cumberland Inlet, and in the spring to start in a boat manned by Esquimaux, following up the east coast of Fox Channel to the Strait of the Hecla and Fury, and so round the bottom of Prince Regent Inlet. The latest account from him is dated from his winter-quarters in lat. $62^{\circ} 51'$ and long. $65^{\circ} 5'$, when he claims to have discovered that Frobisher Strait is an inlet.

Captain Parker Snow is fitting out a small schooner, the *Intrepid*, of 45 tons, in which he hopes to get away in June, and, following up McClintock's track, endeavour to push through Bellot Strait and reach King William Land.

The operations connected with the proposed route for the North Atlantic telegraph has appeared in the Proceedings of the Society: and a translation of a Paper on the currents and ice-drifts on the coast of Iceland has been forwarded by its author, our Corresponding Member, Captain Irminger, of the Royal Danish Navy, which

* Dr. Hayes has since returned, having penetrated north to about $81^{\circ} 30'$.

will also find a place in our Proceedings, as it contains a succinct account of the ice-drifts round the shores of that island from the thirteenth century.

Sir John Richardson's account of the Polar Regions, reprinted from the *Encyclopædia Metropolitana*, has become so popular that there is perhaps no occasion to call the attention of the Members of this Society to it, unless it be to pay a just tribute to the author for the comprehensive view he has given of those portions of the globe which have of late years been the scene of so much exploration.

BRITISH NORTH AMERICA.—By Dr. HECTOR.

The map of the country from Lake Superior to the Pacific coast, at Vancouver Island, which has been recently published in our Proceedings, to illustrate the various reports of PALLISER'S EXPEDITION, gives a clear view of the great additions which have been made within the last few years to our previously scanty knowledge of the geography of this region.

It is now placed beyond doubt that, within the British possessions, there are extensive areas, with good and varied soil, adapted for agricultural colonization, but at the same time subject to all the defects as well as the advantages of a temperate continental climate.

Within the territories of the United States, the Eastern Prairies, which have been so justly celebrated for their wonderful fertility, are succeeded to the west by a more or less arid desert, occupying a region on both sides of the Rocky Mountains, and interposing a barrier to the continuous growth of settlements between the valley of the Mississippi and the rich states of the Pacific coast. It is not therefore probable that, under such conditions, any line of route for heavy or rapid transport will be remunerative, while, in the present disturbed state of America, its construction may be indefinitely delayed. It is thus highly satisfactory for us to know that this central arid tract extends but a short way to the north of the boundary-line; and even there derives its character rather from the nature of the soil than from any climatic conditions. Further, along its northern border, there lies between it and the sub-Arctic forests a belt of land, from which the woods have been cleared by the agency of successive fires, the first and most arduous labour of removing the timber being thus spared to the future settler. This "fertile belt," the first recognition of which most important

feature is due to Palliser's Expedition, stretches from the southern end of Lake Winnipeg in a north-western direction continuously to the base of the Rocky Mountains, and affords throughout land which may be profitably cultivated; so that settlement within our territories will not meet with the same obstacle to its westward progress that it meets within the United States.

In this region the winter, though severe, is not more so than that experienced in Canada; and, in the western districts of the Upper Saskatchewan, the spring commences nearly a month earlier than on the shores of Lake Superior, six degrees farther to the south. On the other hand, in summer, owing to its higher latitude and altitude above the sea, the sun is less powerful; so that many crops which are readily raised in Canada will not meet with equal success here. All the ordinary cereals and green-crops have, however, been grown successfully, though severe frosts at night are occasionally experienced even late in the season. The depth of the snow is never excessive; while the pasture is so rich and abundant that cattle and horses may be left to obtain their own food throughout the greater part of the winter; and, with proper care and attention, there is no doubt that even sheep might be safely reared. It is only during the month of March, when the snow acquires a glassy crust, from the heat of the midday sun succeeded by hard frost at night, that stock would require to be fed.

While thus in some respects this country may bear comparison with Canada, we must not forget the total want of all the finer kinds of timber, which are such a valuable source of wealth to that province. To the settler deficient in capital, but content with the easy life and moderate gains of simple agricultural occupations, the Saskatchewan country offers a most desirable field; and it is only the difficulty of access to it that, for the present at all events, prevents its immediate occupation.

But upon this point we are no longer without abundant and accurate information. The route hitherto used by the Fur Company, which enters the country by Hudson Bay, is so inferior that it has within the last few years been almost abandoned by them; that which they have now adopted, and which physically forms the natural entrance into the country, is through the American territory, from the valley of the Mississippi to that of the Red River of the north. A large portion of the fertile prairies of the latter valley lie to the south of the boundary-line, and will be "settled up" by

American citizens, and traversed by a line of railway; so that, whatever other route may be likewise opened, this will remain permanent, and will in all probability be preferred to any other by the emigrant. The only other route which, for political reasons would doubtless be the most desirable, is that which would connect the Red River settlements directly with Canada, without leaving British territory, by following the canoe-route from the shores of Lake Superior, in a north-west direction, by Rainy Lake and the Lake of the Woods. The united testimony, however, of the many exploring parties which have traversed this region shows that the construction of any such line of communication would be almost impracticable from its expense. This has been rendered only the more apparent by the minute survey of that district by the recent Canadian Expedition, the report of which, although excusably partial, affords small hope of obtaining any means of transport sufficiently inexpensive to be useful to the emigrant, by which stock could be conveyed into the country, or produce find its way thence to the Canadian marts.

There is no doubt that if the country of the Prairies were once inhabited by a large and producing population, this object could be obtained by a line of railway which would connect it directly with Canada; but at present such a line could only be made as part of a great national enterprise, with much wider aims in view than the mere extension of the Canadian settlements westward; as, for instance, the connection of the Canadian provinces with our new colonies on the Pacific coast. From Red River westward such a line, by following the "fertile belt," would pass through country that can be easily settled. The Rocky Mountains themselves, we now know, may be much more easily traversed than was formerly supposed, as they only present a narrow strip between 50 and 60 miles broad, beyond which commence the auriferous valleys of British Columbia. In reaching the Pacific coast from the Rocky Mountains, the difficulties to be overcome by the engineer are far more serious than any to be encountered along the eastern slope; but the mineral wealth of the country, necessitating the construction of roads, affords more inducement to the laying out of money on this than in any other part of the route.

The search for superficial gold ensures the active though temporary settlement of this country; while its buried, but more lasting, mineral products will retain a considerable permanent population,

and give that solidity to the wealth of the country which alone would warrant the construction of such a line of railway through a difficult and otherwise unproductive country.

The advantage of Vancouver Island as the western terminus for such a magnificent work, possessing as it does perfect natural harbours, and abundance of coal of good quality, are already well known to us all. Next year, however, we shall have an opportunity of becoming better acquainted with the resources of our new colonies, as, by advices just received, we learn that the colonists are energetically engaged in preparing a collection of samples of their mineral and other products for the Exhibition of 1862.

In connection with this subject, I may remind the Fellows, that on the islands of Japan and Formosa there exist extensive deposits of coal, which would thus form valuable stations between the north-west coast of America and our Indian dependencies and China—a natural fitness not to be overlooked in a scheme for communication with these countries by the Canadas, Saskatchewan, and British Columbia.

SOUTH AMERICA.—By SIR WOODBINE PARISH, F.R.G.S.

We have received from Dr. V. Martin de Moussy the first two volumes of his work entitled '*Description Géographique et Statistique de la Confédération Argentine*,' recently published at Paris,—the result of four years' travels through the fourteen provinces of the Rio de la Plata for the express purpose of collecting for the Government of that republic, and with their aid, details relative to the physical geography and statistics of their population, agricultural, industrial and commercial capabilities, their geology, mineralogy, and natural history; in fact, to use the author's own words, he has had to form a general encyclopædia of the great basin of the Rio de la Plata, for which a residence of 12 years previously in the neighbouring state of the Uruguay seems to have well qualified him. We shall look with interest for the conclusion of this work, and especially for the atlas which is to accompany it; and in the mean time recommend Dr. de Moussy's book to all persons desirous of the most minute and detailed information regarding the countries of which he treats, and which seem only to require the aid of European emigration on a large scale to develop their vast natural resources, and to make them the most important of all the Spanish American states in South America.

On *Paraguay* another French writer, M. Demersay, has presented

to the Society the first volume of a work he is now publishing, entitled '*Histoire Physique, Economique, et Politique du Paraguay, et des Etablissements des Jesuites*' (Paris, 1860).

The author was sent to South America in 1844 to collect information relative to the least known parts of the interior of Brazil and Paraguay, of which this work professes to give the results. The present volume is divided into chapters upon the political boundaries, the orography, hydrography, and climate of Paraguay, its fauna and zoology, and, lastly, on the ethnological characters of its inhabitants.

At the outset of his travels in South America M. Demersay had the good fortune to find M. Bonpland, the venerable companion of Humboldt, still living at San Borja, who received him with the greatest kindness, and gave him access to the journals and diaries of his own travels and researches during the thirty years previous.

In alluding to M. Bonpland, M. Demersay supplies some information, which will, I am sure, be of interest to the members of this Society, regarding the fate of his papers and collections of natural history. He has no hesitation in stating that M. Bonpland had no work prepared or preparing for publication, although he left a voluminous collection of notes upon his travels in South America, including extensive geological and botanical observations on Paraguay, the Rio Grande du Sud, the province of Corrientes, and the Missions, in which he so long resided. Two chests full of these MSS. it appears have been forwarded to France, and are now claimed by his heirs.

With regard to his collections of minerals and natural history, M. Bonpland had made a special bequest of them to the Museum at Corrientes, which he had himself founded. The Government of Corrientes, however, have offered to give them up to that of France in exchange for books and instruments, which they are more in need of; and, as this offer has been accepted, they will probably be sent to Paris, where they will be most prized and rendered available for the sciences to which they pertain.

AUSTRALIA.

Since the last anniversary the march of discovery in the hitherto unexplored portions of this vast mass of land has been most remarkable. In the adjudication of one of our Royal Medals to Mr. MacDonall Stuart, allusion has been already made to the

value of travels, which, though undertaken under discouraging prognostics, were carried out with such perseverance and ability as to have thrown a new light on the condition and capabilities of large tracts of the interior.

The public must not, however, be led away by the success of this adventurous and successful traveller to adopt the belief that there are vast internal tracts of great *continuous extension* where colonists can settle. The data ascertained by Stuart amount to this—that, at considerable distances from each other, there exist *oases*, refreshed by springs, in and around which good pasturage for sheep and cattle are to be obtained. On the other hand, these oases are separated from each other by broad tracts of bushy scrub, often saline, most difficultly permeable, and in which no trace of springs has been detected. Such intercalated waterless tracts present, therefore, considerable but by no means insuperable obstacles: for, if Stuart could traverse and retrace them with his appliances, how much less will be the difficulty when the scattered and well-watered oases become so many centres of occupation by the location of herdsmen and the erection of rural habitations, such, for example, as Messrs. Chambers and Finke, the spirited employers of MacDonall Stuart, propose to establish.

So soon, indeed, as interest points out the road, most surely then will our adventurous colonists push their flocks northwards, and thus render South Australia mistress of many a tract in the interior.

This once accomplished, and the shores in the vicinity of Cambridge Gulf reached (which Stuart is now endeavouring to effect), we shall then have in our hands the means of establishing a ready line of telegraphic communication across the great continent from the south to the north, to which attention has been specially called by Sir Richard McDonnell, and by which we may place our Australian colonies in direct communication with our East Indian possessions.

This view of the subject necessarily leads us to the main desideratum towards the completion of the successes of our great Australian colonies, by the establishment of a port in one of the numerous deep and capacious roadsteads on the coast of Northern Australia.

Having for many years taken a keen interest in the development of the resources of Australia, this desideratum has been earnestly

pointed out by me to this Society on previous occasions. And now that we see our way to the formation of direct pathways thither across the continent, our Government, if unwilling to lead, may still deem it desirable to lend a fostering hand towards the formation of a settlement in tropical Australia. The surveys of Captain Stokes, followed by the expedition of Mr. F. Gregory, have completely proved that the eastern inlets of Cambridge Gulf and the mouth of the northern Victoria River are spots well adapted to receive a new colony.

Let it not be said that the heat of the climate, about 15° s. latitude, is a fatal impediment to the flourishing condition of any colony of which Englishmen are the leaders, but not the operatives. Nor let the example of Port Essington, which was occupied for a few years and then abandoned, be cited as a warning against the success of a better chosen settlement on that coast. Port Essington, besides being four degrees nearer to the Equator than the head of Cambridge Gulf, was so ill-selected a spot, so exposed to tornados and malaria, that its failure might *à priori* have been predicted. On the other hand, such a site as that near the mouth of the northern Victoria, where Gregory's camp was pitched, might ensure a good result: for there our countrymen lived during many months without the loss of a man, and were surrounded by a rich vegetation, including native cotton. To such a settlement Malays, Chinese, and Coolies would easily be attracted by English wages, and, under the influence of the sea-breezes, cotton plantations might arise, and thus secure for us in our own Australia the very staple on which the chief manufacture of our country relies.

That North or Tropical Australia is destined to be occupied by our countrymen seems to be no longer doubtful, when we look to the advance made towards it by the other colonies of the continent as well as by South Australia.

Thus, Mr. F. Gregory, whose explorations in the interior of West Australia have already shown to how great an extent flocks may be pastured to the eastward of that colony, and have made us acquainted with the subsoil of large districts, is now at the head of an expedition supported jointly by the British and local governments, which, disembarking to the north-east of the Murchison and Gascoigne rivers, is proceeding towards the same goal whither Stuart is tending from the south.

At the same time we learn from Victoria, that with the hearty

approbation of Sir H. Barkly, a great land expedition is proceeding across the interior aided by camels—animals for the first time employed in Australia.

Again, if we turn to the remarkably flourishing new colony of Queensland, we know from the Governor, Sir G. Bowen, that its most forward northern settlers are already pushing on towards the Gulf of Carpentaria, whilst others are working their way gradually westwards into the interior. By such means therefore we cannot doubt that, as the material interests of the colonists lead them to extend their locations, we shall, ere a quarter of a century has elapsed, have so taken possession of the northern coast that no other nation can occupy grounds on which the British flag was first hoisted by Flinders, and whither we have since sent several explorers. In short, Britain being in actual possession of three sides of this continent can never permit any other nation to set foot on the remaining coast, facing as it does her great Eastern possessions.

In speculating, as many persons have, on the probable sterile and saline condition of a large portion of the interior of Australia, it is fair to say that many solid grounds existed to favour that hypothesis. The absence in the interior of any great rivers announces the non-existence of lofty ranges of mountains, and this fact constitutes the great difference between the central region and the eastern fringe of the continent, where a rocky cordillera, rising to a considerable altitude in its southern extremity, is the source of the mighty Murray River. As this chain arrests the clouds fleeting from the Eastern Ocean, it was naturally inferred that the interior on the west, if unprovided with high hills, must be sterile. And so, indeed, to a great extent, it has proved to be. For, although MacDouall Stuart has shown that along one devious path a traverse can be made from south to north, no sooner did he turn eastwards and follow the small streams which rise in the low ridges on the west as they flow to the central depression, than he found them becoming saline at their mouths, and terminating in a great salt lake ranging from south to north.

That this saline lacustrine depression must have a certain width is demonstrated by the fact, that when Sturt explored northwards to latitude $24\frac{1}{2}^{\circ}$, he found himself in a stony, arid desert, which was evidently the eastern side of that great watery saline north and south depression of which Stuart has defined the other side in a lower latitude.

Judging, then, from our present stock of information, it would

seem rational, in the absence of any mountains of sufficient altitude to condense vapour, and with the knowledge that certain waters flowing from low hills tend to a central depression, to infer that other low saline tracts besides those which we already know of will be detected in Central Australia. This view is, indeed, sustained by the exploration of Mr. F. Gregory in his memorable explorations in North Australia, when, after proceeding from the higher grounds near the northern coast, he descended into a lower interior country, and was stopped by its saline character.

But if such should prove to be the case in the internal tracts immediately to the north of Lake Torrens in South Australia, it is certain that the views of Colonel Gawler respecting the probably valuable and well-watered character of a large region lying to the west of Lake Torrens have been realized. Those views are indeed the more to be commended, as they were put forth in opposition to the prevalent opinion, that communication between the several colonies could only be found along the coast. In the mean time enough is already known to enable us to express a confident belief that, ere a generation shall have passed away, all the colonies of Australia will be united, if not by internal roads, at all events by electric telegraphs, whilst through her northern ports she will enjoy a direct communication with India and China.

AFRICA.—By F. GALTON, Esq.

The past year has been characterised rather by the publication of previously completed journeys, and by the outset of new expeditions, than by any accomplished work of actual exploration.

Livingstone is almost the only traveller who has advanced far into Africa since our last Anniversary; and even his journeyings, in which he took back to their home the remnant of that faithful Makololo body-guard whom their chief had confided to his honour, lay too near his previously-described route to afford much geographical novelty. We have, however, from his pen and from that of his brother an exceedingly graphic re-description, careful measurements, and a small map of the unique cataract of Mosisiatunya, popularly called in England the Victoria Falls. They show that Livingstone, in his previous journey, had so anxiously avoided exaggeration as to fall into the opposite error, and that he had considerably underrated the scale of this marvellous cataract. It now appears that the river is upwards of a mile in breadth, and that, when flowing over a level country, it comes suddenly upon a con-

nected series of deep and narrow chasms running in abrupt zigzags athwart its bed, but hardly extending beyond it: these finally widen out, and lead away in the general direction of its course. Into the first of the chasms, which happens to be less than 100 yards across, the entire Zambesi tumbles at a single leap (but in many divisions, at least at the time of extreme low water) to a depth of 400 feet, and thus disappears from the surface of the land. After its fall, the river is visible from occasional points of view, struggling in those strangely-contracted and tortuous depths through which it has to make its further way.

By our last intelligence Livingstone's new steamer had reached the mouth of the Zambesi, and he had started in her to explore the Rufuma River, which may prove the most convenient highway from the coast, to the Shirwa and Niassa lakes. Bishop Mackenzie accompanied Livingstone. He had arrived, with about ten members of the Oxford and Cambridge mission, ready to commence operations at such point as Livingstone might recommend. Yielding to his urgency, he has postponed fixing on any locality until the Rufuma shall have been examined: in the mean time the other members of the Bishop's party are located in healthy quarters, in the Comoro Islands. Sad news has been received of the mortality among a party of missionaries who were despatched to the Makololo overland from the Cape.

Between the Rufuma River and the latitude of Zanzibar, we have to lament the failure of two expeditions undertaken with great zeal. The scientific German traveller Roscher was murdered close to the Niassa Lake, and the Baron von Decken, who started from Zanzibar in prosecution of Roscher's discoveries, and in search of his papers, has been robbed, repulsed, and compelled to return. However, in despite of this mischance, his energy is unabated, and he proposes a fresh attempt on a more northern district of Eastern Africa.*

Captain Speke has taken the first step on his adventurous journey towards the sources of the White Nile. At the date of his last letters † he had attained the high plateau of the interior, over which an unobstructed course lay along his old route to the Nianza Lake. Beyond its southern shore that district of mystery begins, whence

* Intelligence has just been received by Sir R. Murchison, that the geologist, Mr. Thornton, formerly attached to Dr. Livingstone's expedition, had, after recent travels in the neighbourhood of the Zambesi, arrived at Zanzibar, and undertaken to accompany the Baron Von Decken, who was on the point of starting for the snowy mountains of Kilimandjaro.

† See postscript to the *Address*, p. clxxvi.

we shall anxiously watch for his emergence into the basin of the White Nile. But lest he might arrive in distress at those barbarous outposts of North African commerce during the dead season of the year, when no civilized help is to be hoped for, and when adverse winds and heavy rains make further progress impossible either by water or by land, the Council of this Society has made every effort to utilise the proffered services of Mr. Petherick. That gentleman, H.B.M.'s Vice-Consul at Khartum, who is eminently capable from his position and his experience to render the desired assistance, offered to station himself at Gondokoro until July next, with well-armed and provisioned boats, to await the coming of Captain Speke. On our appealing for the necessary funds to the public, by a circular, in which the urgency of the case was explained, we must all have been gratified to witness the liberal response which that appeal elicited. A sufficient sum was speedily subscribed to carry out the above objects, and Mr. Petherick started last month on his journey.

Two travellers, stimulated by the first news of Speke's discovery of the Nyanza Lake, have anticipated him by a whole year in his present attempt. Both M. Legrain and Dr. Peney left Khartum last summer, on the same errand, but by different routes—the former by Kordofan, and overland to the south; the latter in company with a large Egyptian expedition, by boats, to Gondokoro. Dr. Peney appears to have finally set at rest a long-disputed geographical question, namely, the altitude of Khartum above the sea-level. By the published results of a large number of barometrical observations, he describes it to be 1100 English feet.

Lastly, some allusion must be made to the travels and sketch-map of Miani, who describes his route far beyond Gondokoro through a rugged and mountainous country traversed by the White Nile.

There is yet another traveller, the Austrian Consul at Khartum, Dr. Heuglin, in whom German geographers take an especial interest. He has started for Wadai, in search of the lost papers of Dr. Vogel, and with the intention of further research.

*West Africa.**—In Western Africa the energies of England during the past year have unhappily been more engaged in hostile collisions than in geographical research. The interesting republic of coloured men in Liberia has, like our own Australian colonies, encouraged exploration into the unknown interior behind their settlements which produced the results obtained by Seymour

* Dr. Hodgkin.

and Sims, which were referred to in the last Address. The first of these enterprising travellers started on a fresh expedition, hoping to penetrate still further into the interior; but he has fallen a sacrifice to the hardships and dangers to which he was exposed. He was a man whose name ought not to be consigned to oblivion. As one of the generally unfortunate class of persons of mixed African race, by birth Americans, he had not the advantage of early education, but he zealously improved such opportunities for self-instruction as came in his way; and it is doubtless to this cause that much of the value of the information which his energy and perseverance enabled him to collect is to be ascribed. Although he did not pretend to assign or correct latitudes and longitudes, he was able to note the character of the country, its soils and productions, in a manner well suited to advance the interests of commerce and civilization. His companion, James L. Sims, has for the present settled down, devoting himself to agricultural pursuits.

Some really interesting and valuable information regarding Western Africa, not however strictly geographical, is given by Robert Campbell, who appeared before the Geographical Society last year, in his pamphlet on Lagos, Abeokuta, &c., printed in Philadelphia; and Alexander Crummell, a coloured graduate and ordained minister of Oxford, now a resident of Cape Palmas, and whose name appears in the President's Address of last year, has also published an important article in relation to the productions and capabilities of the same part of the world.

Du Chaillu.—Among the great problems which remained to be solved in South Africa, one of striking interest, which was alluded to at our last Anniversary, has been answered by M. Du Chaillu, a Frenchman by birth and education, and now a naturalized citizen of the United States. We have since had an opportunity of hearing from the traveller himself an account of his strange experience, of seeing his collection of huge anthropoid apes, quadrupeds, reptilia, and numerous birds, and of reading the detailed narrative of his eventful wanderings.

Livingstone was the first to reveal to us the great and important fact, that the region of Central Africa, extending northwards from the Cape Colony to 8° of s. lat., is a plateau-land occupied by great lakes, the waters of which, as previously suggested by Sir R. Murchison, would be found to escape to the sea through gorges in subtending mountain-chains of greater altitude than the central watery plains. Du Chaillu, on his part, has

so extended his adventurous explorations from the Western coast, north and south of the equator, as to describe for the first time the complicated river-drainage near the coast, which he has laid down on a map, and also to demonstrate that a lofty wooded chain extends so far into the heart of the continent as apparently to form a band of separation between Northern and Southern Africa. In many a tract to the north of this lofty zone, Mahomedanism has extended its sway; but to the south of it, in these meridians at least, no green flag of the Prophet has yet been unfurled; while a few zealous missionaries, living on the coasts under the Equator, and on both sides of the mouth of the river Gaboon, have established centres whence to propagate the Gospel of Christ. It was in one of those seats of the missionaries that young Du Chaillu, taken thither by his father who traded in the products of the country, first learnt the rudiments of the languages of the adjacent tribes, and obtained sufficient information to induce him, on his return to his adopted home, to fit himself out with presents, medicines, and arms, and then to enter upon one of the boldest ventures which man ever undertook. In vain had the missionaries and trading blacks dissuaded him from such an undertaking by depicting to him the savage character of the tribes of men (some of them cannibals) among whom he must trust himself, to say nothing of the ferocity of the quadrupeds and the impenetrable nature of the densely-wooded jungles and forests he would have to traverse. An intense love of natural history led him to plunge into these hitherto unexplored wilds. The giant anthropoid ape gorilla,* specimens of which had some years ago been for the first time brought to Europe by traders on the coast, was known to flourish in all his pristine vigour in the interior, and many a curious quadruped and bird were described as being common to that region. The die was therefore resolutely cast by the young naturalist; and, with a few black carriers and canoes, and without one white attendant, he dashed into thickets where no European had ever put his foot. Gaining the goodwill of chief after chief, and being probably considered by their sable majesties as a white spirit whose wrath might be fatal to them, and whom they must therefore propitiate, he has been enabled not merely to describe the singular habits both

* Though a few years only have elapsed since specimens of the great gorilla ape were first brought to Europe, there seems to be no doubt that Hanno, a Carthaginian navigator who reached the western coast of Africa southwards, did bring back the skins of the females of certain hairy creatures called *Pepi* and *Peplaaal*, and suspended them in the temple of Juno at Carthage, as evidences of the discoveries he had made. (See the *Periplus of Hanno*, and Du Chaillu's '*Equatorial Africa*,' p. 343.)

of the people and of the wild animals, but also to make a sketch-map of the region, and to define the course of the chief rivers, before and after they unite in a network of streams near the coast. When at the extreme eastern point of his tours, the information he derived from the natives led him to believe that the rocky and densely-wooded mountains really extended for so great a distance to the east that they might be supposed to send out embbranchments into those highlands north of the Unianyembe Lake of Burton and Speke, which these authors called the Mountains of the Moon. Including periods of return to his friends the missionaries on the coast, and his voyages to and fro, he occupied nearly four years in these arduous explorations, and got together a greater quantity of apes, quadrupeds, and birds (some of them never before seen) than probably ever fell to the lot of one unassisted traveller. It is not our province here to estimate the scientific value of these animals, but we know that, in the opinion of Owen and some of the first zoologists of Europe and America,* M. Du Chaillu has not only added greatly to their previous acquaintance with the fauna of South Africa, but has by his clear and animated descriptions, convinced them that he has been as close an eye-witness of the habits of the gorilla and his associates as he proved himself to be their successful assailant. Strikingly attractive and wonderful as are his descriptions, they carry in themselves an impress of substantial truthfulness.

He has introduced us to many novelties in a hitherto unknown land, partly mountainous and partly plain, deluged with heavy rains lasting nine months in the year, overgrown with gloomy forests, and sparsely inhabited by man or beasts. Although its native tribes seem to be similar in their superstitions, their ordeals, and their customs to those we read of elsewhere in African negro-land, the startling fact is presented to us of an avowed system of cannibalism among at least two tribes, who do not appear to be otherwise remarkable for brutality of character. Some passages in Du Chaillu's work throw light on the probable origin of this revolting practice. Thus we learn that animal food is exceedingly scarce, and that, while an abundant supply of the vegetables which

* See Hartlaub's '*System der Ornithologie West Africas*,' 8vo., Bremen, 1857 (Preface). Also Cassin's '*Description of New Species of Birds from Western Africa*,' '*Proceedings of the Academy of Natural Sciences*, Philadelphia, during the years 1855-6-7-8-9.' Appended to these papers, extracts have been printed in his absence from letters to his correspondents—thus furnishing an independent record in the United States of the several journeys of Du Chaillu.

these negroes cultivate is barely sufficient to supply human wants in their depressing climate, their improvidence constantly reduces them to feed on the still less nutritious produce of the forest. Hence an uncontrollable craving for meat attacks individuals, and constitutes a recognised malady called *gonamba*, characterised by a pitiable state of nervous exhaustion. When this state of things prevails among numerous tribes, each of whom develops its own barbarous customs unchecked by the opinion of the rest, it is credible enough that cannibalism should have been resorted to in many instances, and that its practice should now and then take permanent root and become an established custom. In fact, the same want of animal food in New Zealand led, it is well known, to a similar system of cannibalism, before that country was colonized by Britain.

Aware that the faithful description of a region so exuberant in many natural productions, and inhabited by gigantic apes, and in one part by cannibal races, might probably be doubted, M. Du Chaillu is quite prepared to meet all cavillers and objectors. He knows as well as we do that although many of the discoveries of Bruce in the last century were repudiated and treated as fables, yet that, with the advancement of geographical research, the detractors of Bruce have had their own names consigned to oblivion, while the wonderful and so-called "travellers' tales" of the great Abyssinian explorer have been verified by his followers. Knowledge is indeed much more diffused than in the days of Bruce, and, to the honour of the contemporary press, the narrative of M. Du Chaillu has generally met with fair criticism, while most of the periodicals of the last fortnight have awarded to his work that praise to which, in the opinion of Professor Owen, as well as of many geographers, it is eminently entitled. His numerous friends have now only to express a hope that the work on Equatorial Africa may bring much profit as well reputation to the undaunted explorer, who, despite of numerous fevers, has gone over some thousands of miles of hitherto unknown lands, and has brought to us what most will admit to be unanswerable evidences of his fidelity of observation—evidences which the Council of this Society has considerably allowed him to exhibit in our own apartments in Whitehall-place.

Reverting then to what M. Du Chaillu has accomplished as a geographer, and to the sketch-map which he has prepared, let it be well understood that he never claimed to be a man of science. Far

from pretending to have made astronomical observations, or to have determined either distances or altitudes with precision, he has simply told the tale of an adventurous explorer, and has laid down, as well as he could, the outline of his marches and canoe voyages. And when we consider the difficulties he had to overcome, surely we ought to make due allowance, if in the compilation of a work from his rough notes of several years, and in the endeavour to condense the account of so many curious and dangerous wanderings, there are one or two mistakes of dates.

But notwithstanding these defects, no one who reads the work of M. Du Chaillu can doubt, that he did hunt and kill the gorilla in the rocky woodlands of the interior, that he lived among cannibal tribes, and that he has graphically described the physical outlines and vegetation of tracts never before visited by any European. The truthfulness of his statements is indeed borne out by the printed records of the eminent ornithologist, M. Cassin, in the Proceedings of the Academy of Sciences of Philadelphia, at the request of which body he made his second and longest expedition of three years and eight months, and also by references to the very missionaries from whose dwellings he made his excursions.*

Let us therefore unite with our practical geographers, Arrow-smith, Findlay, and others, in attaching due merit to the sketch-map on our walls which has resulted from such labours, and let us join the ethnologists in thanking M. Du Chaillu for his vivid description of wild and barbarous natives. Above all, let us thank him for the indomitable energy and courage with which he has successfully played the part of a bold geographical pioneer.

CONCLUSION.

In the preceding summary of the progress of Geography during the past year, I regret to say that, notwithstanding the various able contributions of my associates, there are still omissions of great importance which must be supplied at our next Anniversary. Thus, as respects Europe, I have not been enabled to lay before you a notice of the advance of our science in Scandinavia, France, Spain, Italy, Greece, and Turkey.

* Whilst these pages are passing through the press, an unexpected and unsought-for testimony to the truthfulness of M. Du Chaillu's narrative has been produced by Mr. P. Lunel Simmonds, in two letters from his brother-in-law, Mr. Walker, a trader, who wrote in 1858 and 1859 from the Gaboon country, and who was himself acquainted with the explorations of our traveller, of whose deeds and character he speaks in terms of high commendation.

In our past Session we have, indeed, been favoured, as noted at p. clxv, with some accounts of various Asiatic regions, of which the sketch, already alluded to, of the environs of Yeddo, and a journey to the celebrated volcanic mountain of Fusi-yana by Mr. Alcock, Her Majesty's Minister at the Court of Japan, is singularly attractive and interesting, and will form a rich addition to our next volume. For this memoir is not confined to a lively description of the customs and habits of the people, but gives us also a clear insight into their very peculiar political and social condition, which seems to have been permanent for at least three centuries.

Thanks to the triumph of the combined forces of England and France, the natural features of the interior of the Chinese empire are now fairly laid open for the first time to geographical explorers.

Among the efforts which our countrymen may make to penetrate these unknown lands, we have every reason to anticipate most striking and original results from the journey which Major Sarel and Captain Blakiston are now carrying out, by ascending to the sources of the Yang-tse-Kiang, in the province of Sze-Chuen, and thence traversing the lofty chain which separates China from Hindostan—a project worthy of a Humboldt.

Again, we are informed that the Government of India, being desirous of ascertaining the real nature of the route between Burmah and China, are about to send a party to determine the position of the hitherto somewhat mythical city of Famok, to the importance of which, and to the best line of commercial intercourse, our attention has been drawn by Captain Sprye. The re-consideration of these interesting subjects will probably form prominent features of the next Anniversary Address.

In now taking leave of you, Gentlemen, for the eighth time, as your acting President, I cannot but feel highly gratified in having witnessed the surprising manner in which our Society has attained its present degree of popularity, and in seeing that it has acquired an influence which is vigorously exercised in promoting the highest behests of geography and travel.

When I bade you farewell in 1859, I prided myself on the fact that our body had increased from 600 to 1200 members, and now I rejoice to announce, that our numbers have further been swelled to 1550; so that we thus actually double the amount of any other scientific body in the metropolis. On a former occasion I had also to congratulate you on having obtained a Royal Charter, in which my efforts to promote your interests were more than fully repaid

by the kindness with which you incorporated my name in that important document.

In the distinguished noblemen who succeeded me, we were unfortunately deprived of the valuable services of one, by his being called to take an active part in the administration of the country; whilst our present leader has, through ill health alone, been less among us than it was his earnest desire to be. But whenever Earl de Grey and Lord Ashburton have been able to preside, we have felt that we made a just selection in placing such men at our head, whilst it was pleasing to observe that persons of their social distinction esteemed it a high honour to be our chiefs.

Lastly, let me repeat, that had our accomplished President been able to attend this Anniversary, I feel assured he would have rendered better service in advancing our cause than I have been able to do in this emergency; and I therefore earnestly trust that at our next Annual Meeting we may welcome him in such good health, that he will then have it in his power to prove to you how truly he has it at heart to promote the continuous prosperity of the Royal Geographical Society.

P.S.—*July 15th.* The last accounts of the expedition of Captains Speke and Grant, communicated by Lieut.-Colonel Rigby from Zanzibar, are dated Dec. 12th, 1860, from Khoko, in Western Ugogo. The travellers had encountered heavy rains, and had lost some of the native followers and mules; but, nothing dispirited, they had killed rhinoceroses, buffaloes, many varieties of antelope, zebras, pigs, and a giraffe, and were proceeding to Tura and Kazeh, northwards, towards the Lake and Gondokoro.

Showing the Coasts explored in 1838.
by Capt. Sir F. L. M. Clontock & His Officers
in search of the Lost Ships of
Sir John Franklin in 1845.
Compiled & Drawn
by John Arrowsmith.

Reference



PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY.

I.—*Narrative of the Expedition in Search of Sir John Franklin and his Party.* By Captain (now Sir) F. L. MCCLINTOCK, R.N., F.R.G.S. (Gold Medalist, R.G.S.)

Read, November 14, 1859.

As geographical discovery formed so important a feature in the voyage of the *Fox*, I have a double pleasure in complying with the request of your noble President, and submitting to you this communication.

I feel sure that the subject of the final expedition in search of Sir John Franklin needs no introduction here: that it owed its origin to Lady Franklin, aided by a few friends, is universally known.

As a post of honour and of some difficulty, I gladly accepted the command, prepared and equipped the *Fox*, sailed from Aberdeen on the 1st of July, 1857, and bade adieu to Upernivik, the most northern of the Danish settlements in Greenland, on the 6th of August.

My object, it will be remembered, was to complete the search in the area left unexplored between the expeditions of James Ross, Austin, and Belcher, upon the north; of Collinson and McClure on the west, of Rae and Anderson upon the south: whilst its eastern boundary is formed by the western shores of Boothia.

The portion of the earth's surface thus defined comprises an area nearly 300 miles square.

Thirty five dogs and an Esquimaux driver were obtained in Greenland, as valuable auxiliaries in our anticipated sledge-travels.

On the 18th of August, when attempting to pass from Melville Bay to Lancaster Sound, through vast accumulations of drift-ice, the ship was seriously obstructed, and finally became beset and frozen up for the winter; then commenced an ice-drift not exceeded in length by any that I know of.

Being unable to travel to the land, or set up a fixed observatory of any kind, and being impelled by the winds and currents, we devoted to them our particular attention.

From all that I was able to observe during our drift down the middle of Davis Strait, the movement of the ice was almost entirely due to wind, and not to current. We did not notice any indication of an under-current to the north; on the contrary large icebergs, which would have been influenced by it, drifted in our company from latitude $75\frac{1}{2}^{\circ}$ N., to the Arctic Circle.

Throughout the winter long cracks or lanes of water were formed at spring-tides, and oft-times closed with sufficient force to crush up their edges into long ranges of hummocks several feet high, and which Captain Sherrard Osborn has graphically described as the "hedgerows of an Arctic landscape."

Fortunately our little vessel was never exposed to this ice-action, although it sometimes took place within fifty yards of our position.

During the autumn and early spring about seventy seals were shot in these water-spaces, affording a good supply of food for our dogs, and oil for our lamps.

It was not until the 25th of April, 1858, by which time we had drifted down to latitude $63\frac{1}{2}^{\circ}$ N., that we were able to escape out of the ice, under circumstances which will long be remembered by all on board. A heavy south-east gale rolled in such an ocean-swell that it broke up all the ice, and threw the masses into violent commotion, dashing them one against another and against the ship in a terrific manner. We owed our escape, under Providence, to the peculiar wedge-formed bow and steam-power of our obedient little vessel.

During the 242 days of our imprisonment the ship's position was astronomically determined, upon the average, twice a week, and the accumulated drift thus ascertained amounts to 1194 geographical miles. Having once more regained command over the *Fox*, our voyage was commenced anew. We directed our course to the Greenland settlements, in the hope of obtaining supplies of fresh provisions: we met, however, with but little success, though what the Danish residents possessed they readily shared with us. Closely following up every offshore movement of the ice, we succeeded in crossing Melville Bay by the 18th of June, and reached Pond's Inlet on the 27th of July. The native village of Kaparōk-tolik, which I visited in company with Lieutenant Hobson and our excellent interpreter, Mr. Petersen, was situated upon the north shore, about 25 miles up the inlet, and at the mouth of an immense ravine between lofty and precipitous cliffs. It was accessible only by sea, the ravine being entirely filled up by a glacier, which reached within a few hundred yards of the water. It was upon the narrow strip of intervening land that these strange people had pitched their summer tents.

They told us that the ice within the inlet decays away every

summer, but as long as any remains there, whales abound. Several large ones were seen by us, and we found amongst the natives a considerable quantity of whalebone, and many narwhal's horns, which they were very desirous of bartering for knives, files, saws, rifles, or wood.

For six days we were in communication with these friendly people, and we satisfactorily ascertained that nothing whatever respecting the Franklin Expedition had come to their knowledge, nor had any wrecks reached their shores within the last twenty or thirty years.

They communicate overland every winter with the natives of Igloodik, and knew of Parry's ships having wintered there in 1822-3; and they had recently heard of Dr. Rae's visit to Repulse Bay, describing his boats as similar to our whale-boat, and his party as living in tents within snow-huts, smoking pipes, and shooting rein-deer. None of his party died there, they all went away the following year. Of the Esquimaux of the lands westward of Repulse Bay they knew nothing, nor had any rumour of ships or distressed white people ever reached them from that quarter.

Our native friends also drew us rude charts of the inlet, showing that it expands into an extensive channel, leading westward to Prince Regent's Inlet. These tracings, together with our own observations and hydrographical remarks during our two coasting voyages along the Greenland shore, fill up many interesting and important details.

After leaving Pond's Inlet, our voyage and search lay along shores which we knew to be uninhabited, at least as far as the Magnetic Pole: we therefore, with the greatest regret, parted from our new acquaintances, but not until after we had carefully extracted from them all the information they could afford.

Proceeding up Barrow Strait, we reached, on the 11th of August, Beechey Island, the scene of Franklin's first winter, and now the site of a house and store of provisions. Here is a cenotaph, bearing inscriptions to the memory of those who perished in the last Government Expedition, also a marble tablet to the lamented Bellot.

In fitting proximity to these I placed a similar memorial, appropriately inscribed to the memory of our lost countrymen in the *Erebus* and *Terror*. It was sent out for the purpose by desire of Lady Franklin.

Having examined into the condition of the provisions and boats, both at this place and at Port Leopold, in order to ascertain how far we could rely upon them should accident deprive us of the *Fox*: and having failed to penetrate more than 25 miles down Peel Sound, in consequence of the ice extending across it, we sailed for Bellot Strait, and arrived there on the 20th of August.

Bellot Strait is the water-communication between Prince Regent's Inlet and the western sea, now known as Franklin Strait. It separates the *extreme northern point* of the American continent from the extensive land known as North Somerset. Its shores are in many parts faced with lofty granite cliffs, and some of the adjacent hills rise to 1500 or 1600 feet above the sea: the tides are very strong, running 6 or 7 knots at the springs. At the time of our arrival Bellot Strait was choked up with heavy masses of drift-ice, and our attempts to pass through it not only failed, but were attended with great danger to the ship. As the season advanced these obstructions were removed, so that on the 6th of September we sailed through and made fast to some ice which remained fixed across its western outlet.

From this date until 27th September, when the advance of winter made it necessary to remove the ship into a suitable position for being frozen up, we constantly and most anxiously watched every ice-movement in Franklin Strait. In mid-channel it was broken up and drifting about: gradually the proportion of water increased, until at length the ice which intervened was reduced to 3 or 4 miles in width; but this was firmly held fast by numerous islets, and withstood the violence of the autumnal gales. It was tantalizing beyond all description thus to watch, from day to day, the free water we so much desired to reach, washing the rocky shore a few miles southward of us, and to feel our utter inability to penetrate the barrier which separated us from it.

Whilst daylight continued, attempts were made to carry out provisions towards the Magnetic Pole, in order to facilitate the sledging operations of the ensuing spring; but these almost entirely failed, in consequence of the disruption of the ice to the southward, and the impossibility of traversing so rugged a country.

Lieutenant Hobson — already distinguished by his sledge-journeys in the vicinity of Bering Strait, conducted these operations, and returned on board the *Fox* with his party in November, after much suffering from severe weather, and imminent peril on one occasion, when the ice upon which they were encamped drifted to seaward with them across Wrottesley Inlet.

Our wintering position was at the east entrance of Bellot Strait, in a convenient harbour named Port Kennedy. It is almost at the junction of the limestone, forming the low shore northward of Brentford Bay, with the lofty granitic land of the interior of the country and western shore, both northward and southward of Bellot Strait.

Although vegetation was comparatively abundant, yet the frequent stormy winds which *draw through* Bellot Strait are probably a sufficient cause for the scarcity of animal life there. Besides our two Esquimaux hunters, several sportsmen, including Mr. Peter-

sen, were almost constantly on the alert; yet during our prolonged stay of more than eleven months only eight reindeer, two bears, eighteen seals, a few water-fowl and ptarmigan were obtained.

Early spring journeys were commenced on the 17th February of the present year by Captain Young and myself. Captain Young proceeded to carry a depôt of provisions across Franklin Strait, whilst I went southward to the Magnetic Pole to meet the natives, and obtain, if possible, some information that might direct us to the object of our search. I was accompanied by the interpreter—Mr. Petersen—and one seaman. We took with us two dog-sledges.

On the 28th of February, when near Cape Victoria, we met with a small party of natives, who readily built us a snow-hut, and spent the night in it with us. We were subsequently visited by about forty-five individuals, and during the four days we remained amongst them, obtained many relics of the lost crews, and also the information that, several years ago, a ship was crushed by the ice and sunk off the north-western shore of King William Island, but that all her people landed safely and went away to a great river where they died.

These Boothian Esquimaux were well supplied with wood and iron, once the property of the white men.

With this important information we returned to the *Fox*, after an absence of twenty-five days of sharp marching and unusually severe weather; the mercury being occasionally frozen for many hours together.

The result of this journey was also important to geography, since it completed the discovery of the coast-line of the American Continent.

Early in April our long projected spring journeys were commenced. Lieutenant Hobson accompanied me as far as Cape Victoria; each of us had a sledge drawn by four men, and an auxiliary sledge drawn by six dogs, this being all the force we could muster.

Before separating we met two Esquimaux families living in snow-huts upon the ice, as is their custom from October until June, when seals and perhaps an occasional bear form their only food; during the summer months they resort to the rivers, lakes, or deer-passes, and subsist on fish, venison, and birds.

From these people we learnt that a second ship had been seen off King William Island, and that she drifted on shore in the fall of the same year; from this wreck they obtained a vast supply of wood and iron.

According to my original plan of sledge-search, matured during the winter, Lieutenant Hobson was to complete the exploration of the north shore of Victoria Land, between Cape Collinson and

Wynniatt's farthest; but in consequence of the information from the Esquimaux, I directed him to search the northern and western shores of King William Island for the wreck, and to follow any traces he might find.

Lieutenant Hobson therefore crossed over to Cape Felix, whilst with my own party and the interpreter I marched along the east shore of King William Island, occasionally passing deserted snow-huts, but without meeting with Esquimaux until the 8th May when near Cape Norton, or, as named in some charts, Cape Smyth; here we found a snow-village containing thirty or thirty-five inhabitants.

They quickly gathered about us, exhibiting the utmost delight at our visit, and eagerness to answer Peterson's questions, but in consequence of their excited state it was very difficult to understand them clearly.

They had not been apprized of our approach, and their independent testimony exactly agreed with that which had previously been obtained.

Bartering was commenced immediately, and continued with much spirit on the part of the natives; I purchased venison, seal, and salmon to supply our wants, and all the relics of personal interest, such as silver spoons or forks which they had. All the wooden articles they possessed including a large sledge, were made of materials obtained from the wreck; had I the means of carrying them away I would have purchased many more things.

They pointed to Peel Inlet, and told us that one day's march up it and from thence four days overland brought them to the wreck. None of them had been there for more than a year, and then but little remained visible above the ice. Their countrymen had resorted to it for several years past in great numbers, and had carried off all that they could. Some few of these people had seen the white men upon their march to the Great River, and said that "many of them dropped by the way," but that this was not known to them at the time, nor until the following winter when the bodies were found.

Most of our information was obtained from a sharp-looking old woman who screamed it out in answer to Petersen's questions, and was either corrected or confirmed by the listeners.

I could not discover the slightest inclination to mislead us, or to hide anything they possessed from our view. We were at length glad to get away from those good-natured but troublesome people, for the women and children could not resist the strong temptation to steal.

The "Mathison Island" of Rae was found to be a flat-topped hill, forming the south-east extreme of King William Island. Pursuing the native route, we crossed the low land behind it, and

met with an Esquimaux family off Point Booth; they also told us that we would find some of their people upon the large island in the Great River, alluding to Montreal Island; yet none were seen there, nor any recent traces of them. These were the last Esquimaux we met with.

Point Ogle, Montreal Island, and Barrow Inlet were successively searched, but without finding any traces of Europeans except a few scraps of copper, tin, and iron, near an Esquimaux stone mark.

Having now overlapped the ground searched by Messrs. Anderson and Stewart when they descended the Back River in 1855, and having no hope of meeting natives by proceeding further up it, I turned to the north-west to complete the search to the spot where our countrymen first landed upon King William Island.

It will be seen that my visit to Montreal Island was in the same time of the year, namely the latter end of May, as that in which the survivors of the crews of the *Erebus* and *Terror* reached it; we saw it in its winter garb as they saw it, and any marks or cairns designed by them to attract attention would have been rendered most conspicuous by the surrounding wastes of snow.

Recrossing Dease and Simpson Strait we continued the minute examination of the southern shore of King William Island without success, until near Cape Herschel, the western limit of Simpson's discovery, when a bleached skeleton was found near the beach, around which lay fragments of European clothing. The snow was most carefully removed, and a small pocket-book containing a seaman's parchment certificate and a few letters was found.

Judging from the remains of his dress, this unfortunate young man had been either a steward or an officer's servant, and his position exactly verified the Esquimaux assertion, that "they dropped as they walked along." The skeleton lay at full length upon a level ridge of gravel just above the beach, in a part which was almost bare of snow; for walking on, especially if the person were fatigued, it was far preferable to the sea ice whereon the sledges would of necessity have to travel.

Simpson's Cairn on Cape Herschell was next day examined; it had been disturbed, in fact, the greater part pulled down; and the impression left upon my mind is, that records were deposited by the retreating crews in this conspicuous and well-known position, but that they were subsequently removed by the Esquimaux.

I will now revert to the proceedings of Lieutenant Hobson. After separating from me at Cape Victoria, he made for Cape Felix, the north extremity of King William Island. At a short distance to the westward of it he came upon unequivocal traces of the Franklin Expedition:—a large cairn of stones, close beside

which were three small tents with blankets, old clothes, and other debris of a station, probably for magnetic or for shooting purposes; but although the ground beneath the cairn was broken into, and a trench dug all round it at the distance of 10 feet, no record was discovered.

The most interesting of these relics, including our national flag, were brought away.

Two smaller cairns were next found by Lieutenant Hobson as he continued his search, and on the 6th of May at Point Victory, the extreme reached by James Ross in 1830, he pitched his tent beside a large cairn which he then supposed to be the one built by that officer. Lying amongst some stones which had evidently fallen off the top of the cairn, was found a small tin-case containing a record, in fact, the record of the long lost Expedition.*

By it we have been informed that, in May 1847, all was well on board the *Erebus* and *Terror*; that in the year 1845, the same year in which they left England, they ascended Wellington Channel to lat. 77° and returned southward by the west of Cornwallis Island, and spent their first winter at Beechey Island. On the 12th of September, 1846, they were beset in lat $70^{\circ} 5'$, long. $98^{\circ} 23'$; and here in the packed ice, about 15 miles off the north-west shore of King William Island, they passed their second winter. Lieutenant Gore and Mr. Des Vœux, with a party of six men, landed and deposited the above record, and another exactly similar which Lieutenant Hobson found in a small cairn one day's march further south. Round the margin of the former of these documents much additional information was given under date of the 25th of April, 1848.

The ships, it states, were abandoned on the 22nd of April, 1848, about 15 miles to the N.W., consequently they had drifted southward only 12 or 14 miles in twenty months. The survivors, 105 in number, under the command of Captain Crozier, landed at this spot, and built the cairn which now exists, upon the site of James Ross's cairn, which must have been taken down by the Esquimaux.

Sir John Franklin died on the 11th of June, 1847, and the

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Having wintered in 1846-7 at Beechey Island, in lat. $74^{\circ} 43' 25''$ N., long. $91^{\circ} 39' 15''$ W., after having ascended Wellington Channel to lat. 77° , and returned by the west side of Cornwallis Island.

"Sir John Franklin commanding the expedition.

"All well.

"Party consisting of 2 officers and 6 men left the ships on Monday 24th May, 1847.

"GM. GORE, Lieut.

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"Party consisting of 2 officers and 6 men left the ships on Monday 24th May, 1847.

"GEO. GORE, Lieut.

"CHAS. F. DES VŒUX, Mate."

James Fitzgibbon Captain H.M.S. "Porpoise"

James Fitzgibbon Captain H.M.S. "Porpoise"
Captains & Surgeons
26th

H.M.S. "Porpoise"

My dear Sir,
I have the honor to acknowledge the receipt of your letter of the 24th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

H. M. S. ships "Porpoise" and "Vernon"

Wintered in the Sea in

28 of May 1841 } Lat. $70^{\circ} 5'$ N Long. $98^{\circ} 23'$ W

Having wintered in 1846 - 7 at Beechey Island
in Lat. $74^{\circ} 43' 28''$ N Long. $91^{\circ} 39' 15''$ W after having
ascended Wellington Channel to Lat. 77° and returned
by the West-side of Cornwallis Island

Commodore.

John Franklin commanding the Expedition
All well

Whoever finds this paper is requested to forward it to the Secretary of the Admiralty, London, with a note of the time and place in which it was found: or, if more convenient, to deliver it for that purpose to the British Consul at the nearest Port.

Quiconque trouvera ce papier est prié d'y marquer le tems et lieu ou il l'aura trouvé, et de le faire parvenir au plutot au Secrétaire de l'Amirauté Britannique à Londres.

CUALQUIERA que hallare este Papel, se le suplica de enviarlo al Secretario del Almirantazgo, en Londres con una nota del tiempo y del lugar en donde se halló.

Enz ieder die dit Papier mogt vinden, wordt hiermede verzogt, om het zelve, ten spoedigste, te willen zenden aan den Heer Minister van des Marine der Nederlanden in 's Gravenhage, of wel aan den Secretaris der Britsche Idmiraliteit, te London, en daar by te voegen eene Nota, inhoudende de tyd en de plaats alwaar dit Papier is gevonden geworden.

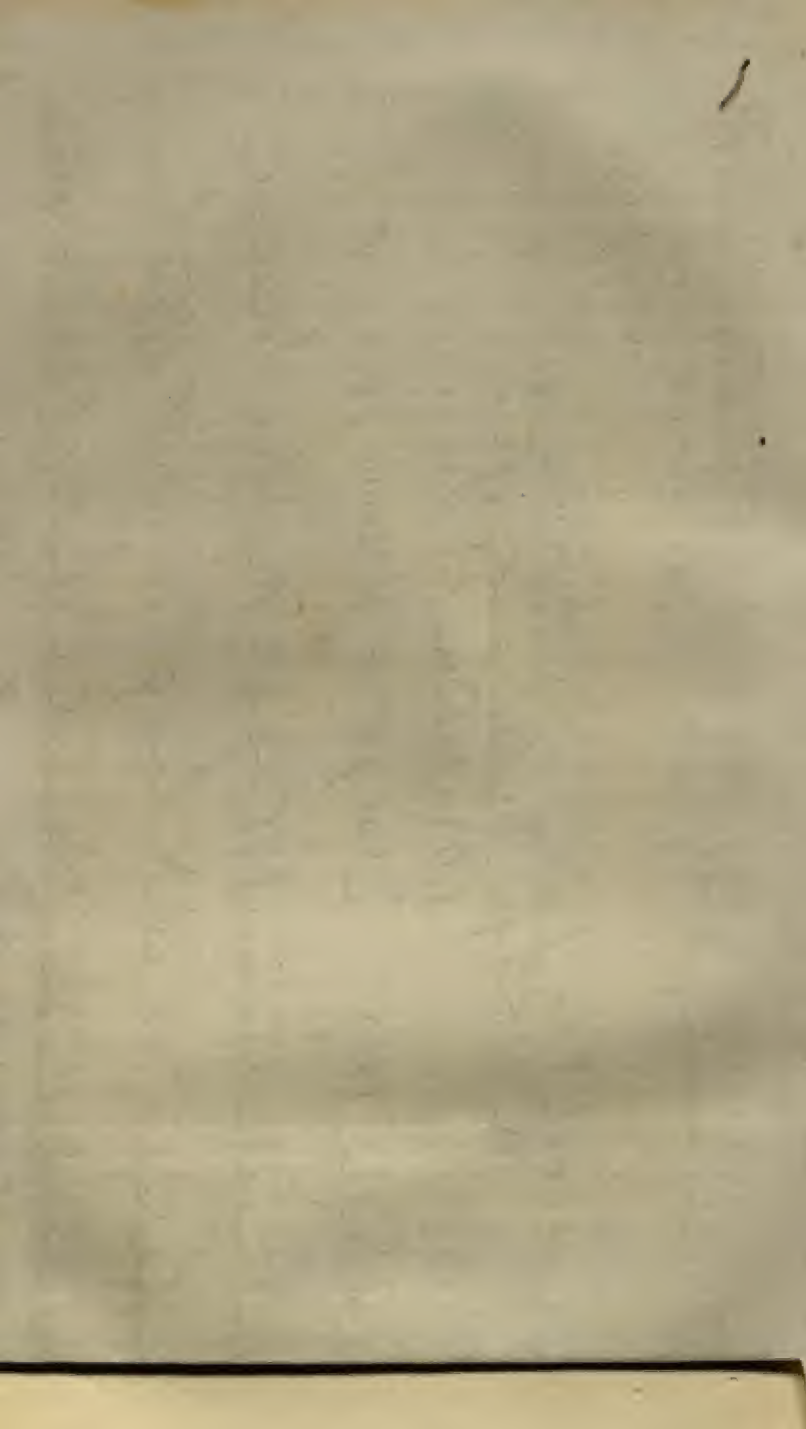
FINDEREN af dette Papiir ombedes, naar Leilighed gives, at sende samme til Admiralitets Secretairen i London, eller nærmeste Embedsmand i Danmark, Norge, eller Sverrig. Tiden og Stødt hvor dette er fundet ønskes venskabeligt paategnet.

Wer diesen Zettel findet, wird hier-durch ersucht denselben an den Secretair des Admiralitets in London einzusenden, mit gefälliger angabe an welchen ort und zu wel cher zeit er gefunden worden ist.

Party consisting of 2 Officers and 6 Men
Left the ship on Monday 24th May 1841

By order
J. M. P. Lieut.
Chas. F. Des Voeux Master.

5848. H.M.S. "Porpoise" and "Vernon" were detached on the 22nd April. 5 leagues N.N.W. of the Cape of Good Hope. The ships were separated on the 24th inst. and the "Porpoise" was found by the "Vernon" on the 26th inst. at Lat. $34^{\circ} 43' 28''$ N Long. $18^{\circ} 39' 15''$ E. The ships were then ordered to return to the Cape of Good Hope.



total loss by deaths in the Expedition, up to the date of their landing, was nine officers and fifteen men.

They intended proceeding on the morrow for Back's Fish River, and this record was signed by Crozier as captain of *H.M.S. Terror*, and senior officer, also by Fitzjames as captain of *H.M.S. Erebus*.

Even their three days' march from the ships seems to have shown them how greatly they had overrated their strength, for here they threw away a vast quantity of clothing and stores of all sorts; in fact, all that was not absolutely indispensable.

Lieutenant Hobson continued his search almost to Cape Herschel without finding any trace of a wreck or of natives. As he retraced his steps he left full information of his most important discoveries for me, so that I had the advantage of knowing what had already been found.

After leaving Cape Herschel and proceeding north-westward along the shore, I found the traces of natives become less numerous and less recent; and after rounding Cape Crozier, the west extreme of the island, they ceased altogether.

When one day's march north-eastward of Cape Crozier, I came upon a boat 28 feet long, mounted upon a sledge of suitable dimensions. A note left here by Hobson informed me of his having discovered her five days before. It was at once evident that this fine boat had been prepared with the greatest care for the ascent of the Back River. In order to reduce her weight, she had been cut down to the thwarts, and very light fir upperworks substituted, supporting a canvas weather-cloth; and she had been fitted with a housing-cloth that the crew might sleep within her, and thus obviate the necessity for carrying tents.

After Hobson's party had dug out the snow which filled this boat, they found a large quantity of clothing and portions of two human skeletons. One of these lay beneath a pile of clothing in the after-part of the boat, and was probably the last survivor—the other lay in the bow; but both had been very much disturbed by wild animals. Two double-barrelled guns stood upright and loaded, as they had been placed, in readiness for use. Watches, silver forks and spoons, small religious books, and articles of all sorts, were found, but neither journals nor pocket-books. Of provisions there remained some chocolate and tea, but no biscuit or meat: there was also tobacco, wood-fuel, and ammunition.

Now, as this boat was only 65 miles from the position of the ships when abandoned, it appeared to me most strange that she should have been deserted so early on the march, the more so as many precious relics remained in her, which might very easily have been carried away. But, on a close examination, I found that she

had been returning towards the ships! So large a boat would require fully twelve or fourteen men to drag her along, and probably thirty or forty men were attached to her; if, then, we suppose them to have run short of provisions upon this return journey, which their failing strength and consequently slow progress render extremely probable, it is easy to understand that she would have been abandoned by the more vigorous, leaving her in charge of those who were unable to keep pace, until their return from the ship with a further supply.

After carefully and minutely examining every article, we continued our painfully anxious investigation of these shores, and on the 5th of June reached Point Victory just five days after Lieutenant Hobson.

With regard to the leading features of the lands along which I travelled upon this journey, the first eighty or ninety miles southward of Bellet Strait lay along a lofty granitic shore, irregular in outline and fringed with rocky islands.

To the southward of latitude 71° pale limestone, of moderate elevation, and almost devoid of fossils, supplied its place, until landing at the mouth of the Back River, when we again found ourselves upon primary rock.

King William Island is rather low—the western shore extremely so—and bears evidence of a gradual and tolerably recent upheaval from beneath the sea: it is almost utterly destitute of vegetation, and consequently of animal life. To seaward is Victoria Strait, covered with heavy and impenetrable packed ice.

That the shore of King William Island, between its north and west extremes—Capes Felix and Crozier—had not been visited by Esquimaux since the abandonment of the *Erebus* and *Terror*, was evident, as the articles lying strewed about, and which in the eyes of a native are of priceless value, remained untouched, whilst southward of Cape Crozier and at the Back River no such traces remained.

To show the propensity of the Esquimaux for destroying all European traces that come within their reach, I may mention that the cairns erected by James Ross at Point Victory and at the Magnetic Pole were entirely removed. On the site of the former the Franklin cairn was reared up, and, most fortunately, had not been visited by the wandering Esquimaux prior to our visit, else no record would have remained for us to discover. Of the huge cairn erected by Simpson on Cape Herschel, they had left but a remnant standing.

Although the whole western shore of King William Island was three times most patiently examined by Lieutenant Hobson and myself, yet no vestige was seen of the wreck. It is doubtful whether

any portion of her still remains above water, and it is probable that she lies upon some of the offlying islets between Capes Crozier and Herschel, unless, like the *Pury*, she has been carried away by the ice.

On the 28th June, Captain Young and his parties returned on board, after having completed their portion of the search, by which the insularity of Prince of Wales Land was determined, and the coastline intervening between the extreme points reached by Lieutenants Osborn and Browne in 1851, amounting to about 300 miles, was discovered.

This extensive coastline was found to resemble the western shore of King William Island: it is composed of limestone, and is extremely low.

The wide channel intervening between it and Victoria Land was packed full of unusually heavy ice, which pressed in upon the western shore of Prince of Wales Land in such a manner as to render it quite unnavigable. Experience has shown us that the prevailing north-west winds bring in, through McClure Strait, vast accumulations of oceanic ice, far heavier in character than that formed in confined seas: it presses heavily against the north-western shore of King William Island and forms an impassable barrier; witness the attempts of Parry and Franklin from the east, of Collinson and McClure from the west.

To the east of King William Island this ice does not exist; on the contrary, from my own observation and from the Esquimaux reports, I am convinced that its eastern and southern shores are navigable every year.

There can hardly exist a doubt that Franklin sailed down Peel Sound and through the channel which now bears his name to King William Island, and there, in the endeavour to force his ships through Victoria Strait, became beset. Had he known that King William Land—so named until 1854—was an island, he would in all human probability have sailed unobstructedly under its lee, and have completed the grand object of his voyage in the year 1847, perhaps even in 1846.

Captain Young also explored the coastline from Bellot Strait northward to Sir James Ross's furthest in 1849 at Four River Bay, but without alighting upon any trace of the lost expedition. In order to enable him to complete these extensive discoveries, which were greatly retarded by keen north-west gales and dense fogs, Young sent back four of his five companions, and with one seaman (George Hobday) and a few dogs to drag the sledge, he continued his great exertions for forty days longer.

Lieutenant Hobson's minute examination of the western coast of King William Island resulted in the discoveries of the records and

of the boat, as already stated, and which he effected with unflagging zeal and sound judgment, notwithstanding his greatly debilitated state.

It has been shown that our small crew was formed into three searching divisions, each working independently of the other two, and each effectually completing its apportioned share of the work. It will, therefore, be readily understood how greatly the success of our explorations depended upon my companions Hobson and Young, and how largely I am indebted to them for their unflinching support.

After mature consideration upon all that I have seen, I am of opinion that the abandonment of the *Erebus* and *Terror* had been contemplated for months previously to its execution; also that the whole crew had become affected by scurvy, and greatly debilitated. We know that Franklin's ships were cut off from all supplies of game for three consecutive winters, and that this is the *only case on record* of ships' crews subsisting *solely* upon their own supplies for so long a period.

The *Investigator* was abandoned after the third winter; but her crew had been able to procure some valuable supplies of fresh food, consisting of game of different sorts, including about 100 reindeer. She lost only three men in this period, yet the whole crew were affected by scurvy. But the *Erebus* and *Terror*, before being abandoned, had lost 24 officers and men, and therefore I conclude that the remainder of their crews were, *at least*, as seriously affected as were the people of the *Investigator*.

There are two important questions which have been so frequently asked me, that I gladly avail myself of this opportunity of offering some explanation upon so deeply interesting a subject.

The first question is, whether some of the 103 survivors may not be living amongst the Esquimaux? The various families—or communities—of Esquimaux met with by Rae, Anderson, and myself, at different times and places, all agree in saying, "No, they *all* died." But let us examine for ourselves.

The western shore of King William Island, along which they were compelled to travel for two-thirds of their route, is uninhabited, and all that is known to us of the mouth of the Back River is derived from the journeys of Back, Simpson, Anderson, and myself. None of us have met natives there, and consequently it is fair to conclude that the Esquimaux but seldom resort to so inhospitable a locality. In fact, their life is spent in a struggle for existence, and depends mainly upon their skill in taking seals during the long winter—a matter which requires such long training that no European has ever yet succeeded in acquiring it.

My two Greenland Esquimaux tried various methods at Bellot

Strait, yet did not succeed ; and without dogs trained to scent out the small breathing holes of the seals, through the ice and through the snow which overlays the ice and conceals them from observation, I do not think that even the Boothian Esquimaux could live. It requires not only that a man should possess a trained dog, but that he himself should be well trained in the only successful mode of seal-hunting in this locality in order to subsist. It is, therefore, evidently an error to suppose that where an Esquimaux can live, a civilized man can live there also. Esquimaux habits are so entirely different from those of all other people, that I believe there is no instance on record of either a white man or an Indian becoming domesticated amongst them, or acquiring tolerable expertness in the management of a kayak.

With regard to the probability of procuring the means of subsistence independently of the Esquimaux, I will just state what was shot by my own sledge party—and we never lost a chance of shooting anything—during the journey along the lands in question, that occupied us for 79 days and covered nearly 1000 geographical miles of distance. The sum total amounted to two reindeer, one hare, seventeen willow-grouse, and three gulls.

The second question is, why have the remains of so few of our lost countrymen been found ?

It is indeed true that only 3 of the 105 were discovered ; but we must bear in mind that from the time they left their ships they were dragging sledges and boats, and therefore they must have travelled almost constantly upon the ice—not upon the land ; consequently all traces or remains there vanished with the summer thaw of 1848.

There is no doubt that many relics still remain strowed along the uninhabited shore of King William Island, beneath the snow ; but as it was most carefully examined three times over, I cannot think that any conspicuous object, such as would be put up to indicate where records were deposited, could possibly have escaped us.

The summer at Port Kennedy proved a warm one, yet the ice did not permit us to move until the 9th of August, and the object of the expedition having been attained, we commenced our homeward voyage.

On the 21st of September I arrived in London, having landed at Portsmouth, and on the 23rd the dock-gates at Blackwall opened to receive the *Fox*.

F. LEOPOLD M'CLINTOCK.

II.—*On the Trigonometrical Survey and Physical Configuration of the Valley of Kashmir.* By WILLIAM H. PURDON, C.E., F.R.G.S., &c., Executive Engineer, Punjab.

Read, December 12, 1859.

I REGRET it has not fallen into abler hands than mine to give you an adequate idea of the magnitude of the operations of that magnificent national work the great trigonometrical survey of India. Those, however, who are desirous of learning the details of the manner, progress, and expense of that great geodetic undertaking, will be well repaid by a perusal of the succinct and very able report of Colonel Waugh, the present Surveyor-General of India (published by order of the House of Commons in 1851).^{*} This great survey extends over nearly 26° of latitude and 28° of longitude; and is without a parallel, either as regards its accuracy, its extensiveness, or the unity of the effect by which it has been achieved. It would be almost impertinent in me, before a meeting of the Royal Geographical Society, to enter at length into the advantages to science—geographical science in particular—of such undertakings. Almost every nation in Europe has, by its own efforts in a similar direction, practically testified to the importance and value of trigonometrical surveys; while almost all the learned societies of the continent have borne testimony to the high character of the trigonometrical survey of India and of its distinguished conductors. It is now universally acknowledged that trigonometrical surveys, corrected for spherical excess, and the spheroidal figure of the earth, are the only accurate bases for the geography of any country.[†] It is to the late Duke of Wellington that the great trigonometrical survey of India owes its origin. It was commenced under his auspices by Colonel Lambton, shortly after the fall of Seringapatam: and it has been carried on (notwithstanding many interruptions, owing to the disturbed political state of the country) by the steady support of the Indian Government, whose perseverance was well worthy of the original great design. The immediate results of Colonel Lambton's

^{*} Colonel Everest, of the Bengal Engineers, and one of the Vice-Presidents of this Society, who succeeded to the charge of the Trigonometrical Survey on the death of Colonel Lambton in 1823, had been that officer's chief assistant since 1816. The whole system as respects field-works was changed by Colonel Everest, and in his Second Report of the Operations of the Survey, published at the close of his connection with it, may be seen a detailed account of the new system of signals, heliotropes, lamps, &c., as well as of the other changes introduced by him in that great work. In that Report, which brought the account up to the time of his retirement in 1843, Colonel Everest suggests the extension of the survey over the Himalaya, with a view that it might be ultimately carried on to Chinese Tartary and connected with the Russian Survey, so as to extend the meridional or areal measurements from Cape Cormorin on the south, to Nova Zembla on the north.—*Ed.*

[†] *Vide* Colonel Blackie's Report.



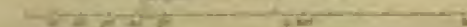
Map of the
VALLEY OF KASHMIR

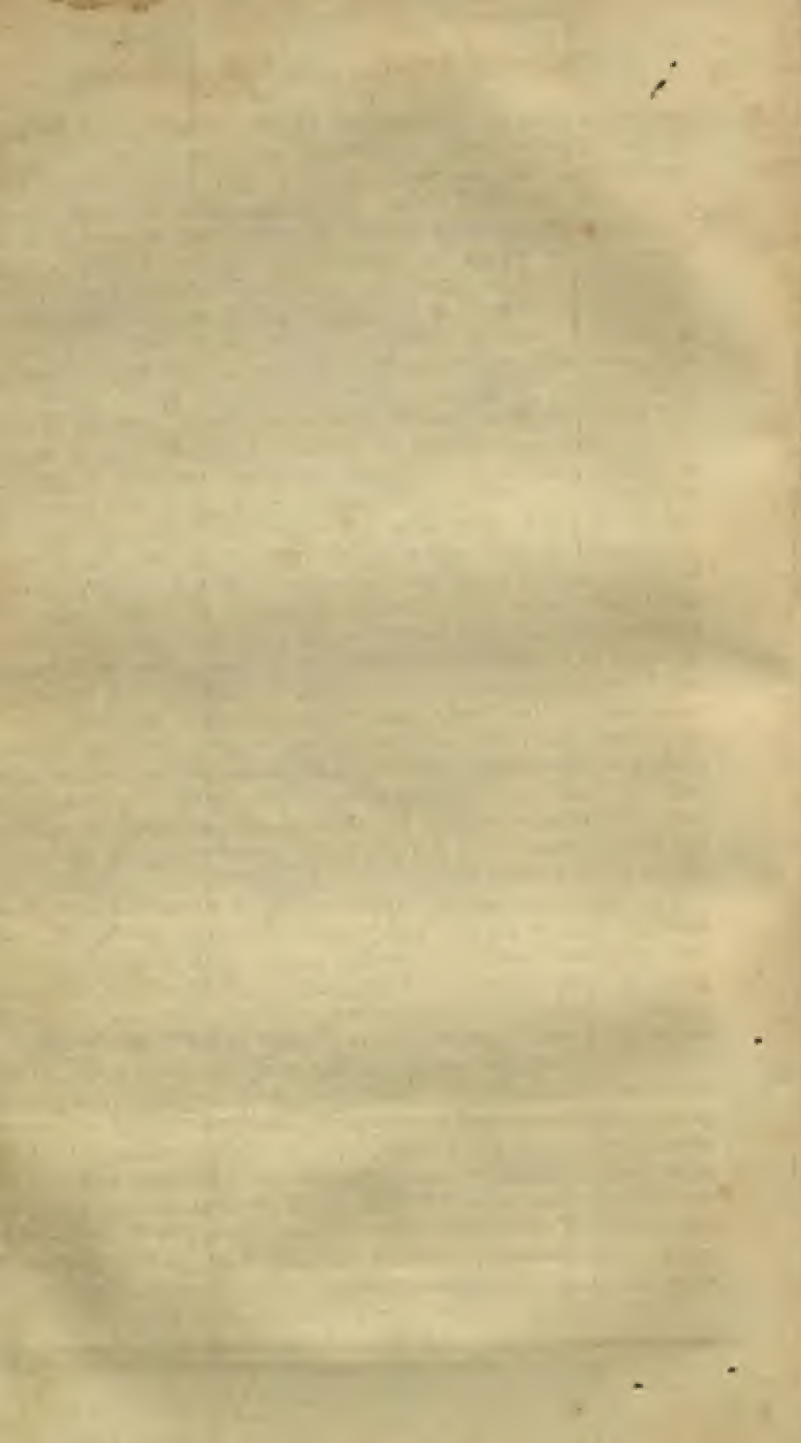
*from surveys made by Capt^d T. G. Montgomerie under the direction of
The Surveyor General of India,
to illustrate the Notes of
Capt^d Godwin Austen and William Pardon Esq^r.
to which is added,
a Sketch of surrounding Countries.*

English Miles on the Survey Map



English Miles on the Sketch Map





operations were, the discovery of an error of more than 40 miles in the breadth of the Peninsula, as formerly laid down by astronomical observations; and further, that nearly all the chief towns were misplaced on the old maps. The advantage reaped by mathematical science was, a more accurate knowledge of the figure of the earth, as deduced by Colonel Lambton, by a measurement of an arc of the meridian. "A true knowledge of the figure of the earth is no mere object of curiosity, inasmuch as it effects a large proportion of the calculations upon which navigation is based, especially those in which the moon's parallax is an element."

"But there is no branch of physical science, specially effected by the three co-ordinates of latitude, longitude and elevation, in which great trigonometrical operations are not of primary importance."* "The triangulation of the great trigonometrical survey of India supplies a permanent and accurate basis for the present as well as for future internal surveys; for it must be borne in mind, that as the resources of the country become developed, under the fostering protection of British rule, the topographical aspect of many districts must, in a moderate number of years, be completely changed. Tracts, now covered with jungle, will be reclaimed, canals will be dug, marshes drained, and roads established. New towns and villages will arise, and fresh groves be planted, and rivers will change their course; for these reasons, revised surveys will be required; and these, like the present ones, will be based on the operations of the great trigonometrical survey of India, which are intended to form a lasting monument for future generations, and an imperishable record of the landmarks of the present time."

The foundation of the triangulation, of which the survey of Kashmir forms a portion, was commenced shortly after the Punjab was conquered, and it is to the prompt and powerful support given to these operations by the late Lord Hardinge, that the valuable results, of which the topographical map now exhibited forms but a small portion, was, in the first instance mainly due.

The topographical survey of Kashmir is based on the great trigonometrical survey of India: the whole country, by means of primary and secondary triangulations, was covered with trigonometrical points, at an average distance of little more than four miles from each other; the topographical detail was sketched in the field on plane table. "Altogether, the area already surveyed amounts to 22,000 square miles in three years, and 40,000 square miles of triangulation, including all Little Tibet, in four years; the chief merit of which achievement," adds Colonel Waugh, "is

* *From Colonel Waugh's Report.*

deservedly due to Captain Montgomerie." Considerable physical difficulties were imposed, by the nature of the country and survey, arising from the necessity of ascending, and encamping, on snowy mountains of great elevation; out of the 16 principal stations in Tibet, 14 exceed 15,000 feet in height, two were over 18,000 feet.* On the principal series of triangles, the observations were invariably made to luminous signals, viz. heliotropes and lamps; notwithstanding the physical difficulties and the severity of the climate on the snowy peaks, so especially trying to the natives of India, who served the signals. Occasionally, in consequence of clouds and storms, the party had to remain pitched on the snow for upwards of a week at a time. On the Pir Punjal peaks, the electricity was so troublesome, even when there were no storms, that it was found necessary to carry a portable lightning-conductor for the protection of the theodolite."

Colonel Waugh pays a willing tribute to the cheerfulness with which the native establishment endured the hardships to which they were necessarily exposed. "The signallers and head-men were mostly natives of Hindustan, to whom extreme cold is a condition of positive suffering; yet these men have been loyal, cheerful, and contented, as they have indeed been in all survey parties over India during the mutinies, though many are of the same class as Sipahis, among whom they had brothers and relations." But the physical character of the country formed by no means the chief difficulty of the survey, conducted in a foreign territory, and which at no time could be expected to be agreeable to the ruler, his officials, and people. To them the influx of a considerable body of surveyors, spread over the country, however orderly and well-conducted, must bear the aspect of an intrusion. It is to the tact, delicacy, and ability, with which Captain Montgomerie maintained amicable relations with the court, a most difficult one to deal with, and preserved discipline in a large mixed establishment, that the successful completion of the operations of the survey are chiefly due.

Colonel Waugh estimates the total area of British India at 800,758 square miles, and that of the native states at 508,442 square miles, making a total of 1,309,200 square miles. "This," he adds, "is the area of the survey under my charge." "A complete delineation of this vast superficial extent, amounting to nearly $1\frac{1}{2}$ million square miles, confined with an external boundary of 11,260 miles in length, including every variety of configuration and climate, is an undertaking of unprecedented magnitude; demanding considerable time to accomplish with any pretensions to mathematical accuracy." "The exertions," adds Colonel Waugh,

* See Captain Montgomerie's Report to Colonel Waugh.

"hitherto made, have been unremitting, and it is but justice to say that the progress has been, generally speaking, as creditable to the officers employed, as the results have been useful to the country."^a

It has been asked: When will the survey be completed? It should be remembered how vastly our dominions in India have extended since Colonel Lambton laid down his base line. The conquest of the Punjab and Sind alone added nearly 170,000 square miles of territory; nevertheless, in a few short years, the net-work of triangles will have been woven over the entire continent of India. Further, it may be added, that the Ordnance Survey of Great Britain was commenced before Colonel Lambton laid down his base line, and that India is more than twelve times as large as Great Britain. A copy of the Index to the Indian Atlas, which Mr. J. Walker, the Hydrographer to the Government of India, has kindly prepared for me, coloured, so as to show at a glance the actual amount which has been surveyed. Of the 121 squares, which, when complete, will embrace the entire Peninsula, 59 have already been engraved, on a scale of 4 miles to the inch, and are available to the public, at a cost of four shillings each, coloured: many others are in an advanced state.

I would now venture to offer some remarks on the physical configuration of that most interesting and beautiful portion of the earth, the Valley of Kashmir. My own observations were made during two explorations of the valley, in the years 1854 and 1856, which were undertaken chiefly with the view of obtaining some knowledge of its geological structure. On these occasions I took with me several barometrical and other instruments for determining heights, &c.

Kashmir appears to have been a regular kingdom for a period that transcends the limit of legitimate history.† Herodotus,‡ the father of history, informs us, that a portion of Upper India, including Kashmir (Kaspatyrus), formed the twentieth Satrapy of the vast Persian Empire, under the reign of Darius Hystaspes, who flourished 521 years before Christ. Amongst

^a Colonel Waugh's Report.

† *Vide* Professor Wilson's Report.

‡ Thalia, cii. Elsewhere, Melpomene, xliv., Herodotus describes Kaspatyrus as on the banks of a river navigable thence to the Indus; from which some writers are led to suppose it must have been on the Kabul River. I doubt very much whether a fleet of ships could have sailed down the Upper Indus. Too much stress must not be laid upon this passage. We find our own countryman, Sir Thomas Roe, who ought to have been able to obtain correct information, describing the river Beht as falling into the Ganges; "though," he adds, "some say it runs into the sea in the north part of the Bay of Bengal." *Vide* Roe's Travels, in Churchill's Collection, ed. 1744.

Hamilton, who visited India in 1688-1723, describes the Indus as navigable for vessels as high as Kashmir. *Vide* "Account of the East Indies," Edinburgh, 1727.

ancient authors who allude to Kashmir, we find the venerable names of Ptolemy, Strabo, and Pliny. Ptolemy indeed very accurately describes the position of the valley itself, which appears at that day to have given its name to the whole country as far south as the Viudya mountains,* which formed, as we learn, the southern boundary of the Aryavarta or Holy Land of the Hindus. Our Honorary Member, Carl von Ritter, considered Kashmir, with Tibet, as the intellectual cradle of the Hindus, although not the primeval source of their civilization, and the Hindus of the present day themselves consider Kashmir as holy ground.†

The most ancient Hindu history extant, the *Raja Frangrini*, is a history of the kings of Kashmir. It was compiled in the twelfth century, from the works of seventeen authors, as well as from the archives of the temples, and gives lists of the dynasties and powers that ruled in the valley, as well as describes the building of the temples in the valley, the ruins of which, form some of the most interesting monuments in India, of an ancient and high civilization.‡ We learn from this history of the long past, that at a period, when half Europe was in a state of semi-barbarism, the Hindu had attained an excellence in many of the arts, architecture, sculpture, &c., in some of which they are to this day unrivalled. Down to the time of the Venetian traveller, Marco Polo,§ who wrote in the thirteenth century, Kashmir appears to have existed as an independent kingdom, and the population to have been chiefly Hindu, although followers of Buddha existed there; a sect which does not appear to have been quite exterminated even in the sixteenth century, as the Mohammedan historian, Abul-fazel, tells us that near two thousand of them existed in Kashmir in his day.¶ It appears that in early times,

* Vide also Lassen *De Pentapotamie Indica*.

† Mas'udi, the Arabian historian who wrote A.D. 947, observes, "The kingdom of Cashmere forms part of India; it is surrounded by very high mountains; it contains a prodigious number of trees and villages; it can be entered only by a single pass which is closed by a gate." This evidently alludes to the Baramulla Pass, across the entrance of which a wall, with forts, connecting a bridge over the river, formerly existed.—W. P.

‡ Compiled by Kalhana the Pundit. Vide a translation in French, by M. A. Troger, Paris, 1840.

§ Vide Marsden's translation, published by Bohn.

¶ The most ancient religion of Kashmir was the orphite or snake worship; it was suppressed by the Buddhists; the first thirty-five kings of Kashmir were Buddhists; Buddhism was in the zenith of its fame in the time of Asoka, B.C. 283, 226; he it was who erected the *lathas*, or inscribed pillars.

Brahminism was introduced about the first century of our era; the two religions appear to have flourished contemporaneously; when Fa Hian, the Chinese Buddhist, visited Kashmir in A.D. 399, Buddhism was in the ascendant there. Ramagupta, King of Kashmir, in the tenth century, destroyed the Buddhist images and burnt the monasteries.

Kashmir, the ancient seat of the Hindu religion and literature, furnished Southern India with carved images of the deities for the temples, and it was the wealth, derived from its manufactures and its idolatrous sanctity, which tempted the avarice and caused the zeal of the Mohammedans, by whom it was invaded at an early period. The last Hindu sovereign of Kashmir, the heroic Rajpootnee princess Koteran, having lost her kingdom by an internal insurrection, perished by her own hand in A.D. 1341; the valley then passed into the hands of independent Mohammedan kings, who held possession down to A.D. 1586, when it was reduced by the Emperor Akbar, and became an integral portion of the empire of Delhi; and its pleasures perhaps contributed not a little to hasten the downfall of the Mogul dynasty. In A.D. 1753 it passed from under the sway of the Mogul throne into the power of the Affghans, from whom it was wrested by the Sikhs under Runjeet Singh in 1819; "then, after the lapse of nearly five centuries, it again fell under the sway of a Hindu sovereign."

When the Sikhs took possession of the valley in 1819, the population is said to have numbered 800,000. Shortly after, an earthquake destroyed 1200 persons, a pestilence followed, which is said to have carried off 100,000 more, and a great famine added to the miseries of the people, thousands of whom died, and many fled the country to Hindustan and the Punjab, so that in 1833, the total number is said to have been reduced to 200,000: of this, about 30,000 are Hindus of the Brahmin cast and Sikhs; the remainder are Mohammedans, chiefly of the Sooni sect.*

Years of oppression and systematic tyranny have completely changed the character and broken the spirits of this once brave and warlike race, for although still the finest specimens of the Indian race, and remarkable for their symmetry and strength, they are wholly wanting in all the finer qualities for which they were formerly distinguished, and have at length acquired the vices of slaves. The exceeding wretchedness of the villages, and poverty of the inhabitants, have for years past formed a theme for the description and commiseration of every traveller.

The best work on Kashmir is Mr. Vigne's, *F.R.G.S.*; it is perhaps not so philosophical as the Baron von Hügel's, but it is far more practical, and a better guide-book, while it is eminently trustworthy; the map which accompanies it has, for a long time past, been the mine whence others have been manufactured; and when the time,

* The language of Kashmir is considered by the learned to be of undoubted Sanscrit origin, but considerably corrupted by the number of Persian words introduced by the Mohammedan conquerors. *Vide* Major Leech, on the Kashmir Language.

and difficulties under which it was compiled, are considered, it must be regarded as an astonishing production.*

Captain Montgomerie's survey shows that the valley is surrounded by a well-defined and connected Cordillera, which varies in height to nearly 18,000 feet above the sea; this is covered with snow for at least eight months in the year. Humboldt describes it correctly as a true caldron-shaped valley in the midst of the Himalaya.

The valley of Kashmir is somewhat of an oval form; its greatest length being, from north-west to south-east, 89 miles; the breadth varies from 10 to 35 miles. The lowest part of the valley is the Wullur lake, which is 5189 feet above the sea; the average height of the valley may be taken at about 5500 feet above the sea. The distance of the high ridge, from what may be termed the valley, varies from 10 to 20 miles; one of the most striking points is that of the Haramuk mountain, which, rising immediately over the Wullur lake, reflects its lofty summit in its surface. The summit of this mountain is 16,903 feet above the sea, and it is one of the highest points seen from the valley, while it is but 14 miles distant in a direct line from the Wullur lake. The high range, which separates the valley from the plains, is called the Pir Punjal range, the highest point of which is 15,528 feet above the sea.

The monarch of the mountains which surround the valley is the magnificent mass of Dayamur, or Nanga Parbat, literally Naked Mountain; so called, from its being bare of snow, owing to the remarkable steepness of its sides. This mountain reaches the enormous height of 26,629 feet above the sea. It is but 65 miles distant in a direct line from the Wullur Lake, and upwards of 21,000 feet above it. It is the culminant point of a great mass of mountains, which, for 15 miles from it as a center, are over 20,000 feet in height; it is 900 miles distant in a direct line from the Great Mount Everest, and lies on the range of the true Himalaya, which even in this latitude, $35^{\circ} 14'$ N., asserts its great superiority over all other mountain ranges in the world.†

A recent letter from Northern India informs me that Captain Montgomerie has discovered in the Kārākorum, or Trans-Tibetan Chain, a peak measuring 28,400 feet above the sea; and Colonel Waugh, in his letter to Government, alludes to a peak measuring 28,270 feet above the sea; so that it is probable that here a rival will be found even to Mount Everest itself. We know as yet little of this region. Dr. Thomson ascended the Kārākorum

* Hügel's map was made by Arrowsmith from the Baron's own MS. map, in conjunction with data from Moorcroft's and Trebeck's journals.—Ed.

† This mountain ranks fourth amongst the highest measured summits on the globe.

Pass in 1846. He found it to be 18,660 feet above the sea ; a great height for a pass, even in the Himalaya. We have a record of this pass having been crossed by the Chinese pilgrim, Fa-Hian, fifteen hundred years ago.*

There are perhaps a dozen passes by which the valley may be entered ; the following are the heights of some of the principal :—

	Feet.
Koksar Pass	13,315
Murkul Pass	11,550
Murgan Pass	11,600
Pir Punjal Pass	11,400
Banihal Pass	9,200
Ratan Pir Pass	8,200

The valley is drained by the Jhelum river, called Vehut in the valley, the Bedusta of ancient times, which the Greeks changed into Hydaspes. It has its source in the Sesha Nag lake, at the head of the Lidur river. I found this lake to be 11,250 feet above the sea ; it is situated in a small amphitheatre of mountains, points of which reach 17,000 feet above the sea. This lake is the most distant source of the Jhelum river, and the Lidur the largest of its tributaries. This stream passes through a most picturesquely-wooded rocky glen, for a distance of about 35 miles to Islamābād, in the valley through which the Thelam winds, for a length of fully 90 miles, in snake-like curves, and with a gentle current, spreading out in places into several lakes, the largest of which, the Wullur Lake, is a fine expanse of water, 10 miles in length by 5 in breadth.

In ancient times, the river was carefully inclosed by banks, to prevent inundations ; these, however, have long been neglected, and now many square miles of the flat lands are reduced to swamps, by the constant overflow of the river, when swollen by the melted snows.

The Jhelum enters the Himalaya, near Buramula, penetrating the range, in a direction nearly at right angles to the strike of the hills, for a distance of about 20 miles, in a direct line to Uri, whence its course lies along the strike of the outer range, following a line of fault to Mozufferabad, about 40 miles, in a direct line to the north of Uri.

The defile by which the river Jhelum leaves the valley of Kashmir, is perhaps one of the grandest in the world. The great chain of the Himalaya is cleft in two by a great chasm, upwards of 7000 feet in depth ; the bottom is very narrow, and is wholly occupied by the river ; near Uri it is but 70 feet across, with almost perpendicular sides ; through this natural sluice passes the

* Fa-Hian, A.D. 399.

whole volume of the Jehlum River, with the most astonishing velocity.*

The whole way from Baramula to Uri the scenery is one of striking grandeur. In the first 10 miles, the river, although confined to a narrow channel, meets with few obstacles to oppose it, and, with a calm consciousness of its own strength, rolls onward with an almost noiseless tide. For the next 15 miles the bed of the river is a succession of rapids, and a mass of foam, which forms a fine contrast to the dark mass of forest of oaks, planes, and cedar trees, which clothe its banks down to the very edge of the water. It is only along this section of its course that the river deserves the name of the "Cedar-fringed Hydaspes," for this tree is rarely found in the valley of Kashmir, nor does it grow at lower elevations. The river is here about 4500 feet above the sea.

It is probable that the cedar forests, through which the river here flows, furnished the fleet of Nearchus upwards of twenty centuries ago. The Punjab obtains its chief supply of this almost imperishable timber from these forests.

I may here state, that recent surveys have established the fact, that where the classic stream Hydaspes debouches into the plains of the Punjab, Alexander fought his last great battle in India, defeating his powerful and gallant foe Porus, the king of the Upper Punjab.

The river there, flowing through a rocky bed, has so little changed its features, that the description of the locality, given by the Greek historian Arrian, corresponds almost minutely with what we now see it. The British Cantonment of Jhelum marks the site of Bucephalia, the city which Alexander founded in memory of his celebrated charger. Many interesting relics have been found in the vicinity.

The district which there borders the river is still called Sikunderabad. Sikunder was the name by which Alexander was known in India. This is a singular instance of the preservation of an historical fact through so many generations. Alexander fought this battle 326 years before Christ.

It would be impossible to convey any idea of the exceeding grandeur of the scenery of the valley of Kashmir itself: unquestionably the finest view is obtained from the summit of the

* The traveller seldom enjoys a very extensive prospect of this truly grand defile, owing to the abrupt bendings of the river and the precipitous nature of the sides. In places the slopes are remarkably steep: a little beyond the village of Gingsal, a point of the high range reaches a height of 11,583 feet above the sea, or 7600 feet above the river; in a horizontal distance of 3 miles, another peak, called Kaj Naj, is 8100 feet above the river, and but 5 miles distant; another is 10,400 above the river, and but 8 miles distant from it; these will suffice to give some idea of the features of this remarkable defile.

Takht-i-Suliman hill,* which, rising abruptly fully a thousand feet above the plain, and situated almost in the center of the valley, commands every object of interest around it. The panorama which this position affords, is one unrivalled for variety, extent, or magnificence. The valley itself one of the largest in the world, and the mountains which surround it amongst the highest, grassy plains, snow-clad summits, river, lake, and forest, every element in fact of fine landscape, and all on a grand scale, are here seen blended together in most perfect harmony.

But the great charm of the valley is its variety. The traveller can, in the course of a few short hours, enjoy almost every variety of scenery and climate; while the man of science, the botanist, the geologist, or the antiquary, will find abundant matter for contemplation; add to this, that the climate of the valley is perhaps unrivalled; in the hottest months the thermometer rarely rises above 75° or falls below 50°, while in the winter it is not often seen much below the freezing point. The valley itself is adorned by trees, chiefly the mulberry, the chesnut, and Oriental plane; groves of which, with poplars, were planted in every village by the Mogul Emperors. Nearly every variety of fruit known in Europe flourishes in the valley, with the exception of the orange, the lemon, the fig, and the olive.

"It is to the enlightened and beneficent Akbar, the first Mogul Emperor of Kashmir, that it owes many of its chief attractions. It was he who caused it to be surveyed and reduced to order, beautified it with palaces and gardens, leaving little else to his son and successor, the magnificent Jehangir, than to enjoy the delights of this eastern paradise, in company with his empress, the peerless Noor Mahal, whose romantic spirit appears to have led her lord and emperor to roam into the most secluded and picturesque recesses of the valley, many of which pleasant retreats are to this day pointed out as the spots where the royal pair were wont to disport themselves in those days of regal abandon."

Jehangir built many palaces and summer-houses; more especially he completed the construction of the celebrated Shalimar Gardens, immortalized by poets and travellers. The Nasam (or Salubrious) and Nirhat Bagh was the fancy of Noor Jehan Begum, to whose taste many other beautiful retreats owe their origin. The ruins of the palaces at Manasbal, Echibul, Virnay, &c., attest her taste in selecting picturesque sites.† The summit of the Takht-i-Suliman hill is crowned by a most ancient temple, built 220 years before Christ, and still in an almost perfect state. This is the oldest

* Immediately over the Capital, Socragar, built A.D. 432.

† *Vide* a Sketch of the Mohammedan History of Cashmere, by Lieut. D. Newall, of the Royal Artillery, Journal As. Soc., 1854.

temple in the valley, and certainly occupies the finest position in it; here, as indeed everywhere in the valley, I have been struck with the fine appreciation of natural beauty the original inhabitants of the country evidently exercised. The site selected for a temple invariably commands the most picturesque view to be obtained in the vicinity. "A profound love of nature," observes Humboldt, "has been at all times a fundamental character of the Hindir mind."*

The valley is studded with the ruins of temples, which bear unmistakable evidence of the influence of Grecian art; they were built by its ancient Hindu sovereigns, but reduced to ruins by the bigoted zeal of the idol-breaking Sikandar, the Mohammedan prince who flourished in the early part of the fifteenth century. "The Kashmirian fane is distinguished by the graceful elegance of their outlines, by the massive boldness of their parts, and by the happy propriety of their decorations. They cannot indeed vie with the severe simplicity of the Parthenon, nor with the luxuriant gracefulness of the monument of Lysicrates, but they possess great beauty; different indeed, yet quite their own."† They were built in the most substantial manner, of large blocks of marble, highly polished, and finely chiselled.

Of the many routes by which the valley may be reached from the plains, that which follows the course of the river Jhelum is the only one which is not closed by snow for some portion of the year. The route by the Pir Punjal is the most direct, and, when the pass is practicable, is the most frequented. This pass is one of the highest, being 11,400 feet above the sea; the ascent, however, from the valley is gentle, the rise being under 5000 feet in a horizontal distance of $17\frac{1}{2}$ miles. The descent, however, on the other side is very steep; Colonel Cunningham, a very extensive traveller, considers it one of the worst in the Himalaya. My observations make the fall 4900 feet in a horizontal distance of 6 miles, or a slope of about 1 in $6\frac{1}{2}$; the slope of the next, or Rattan Pir range, is still steeper, being 1700 feet in a horizontal distance of 2 miles, or less than 1 in 5; that is, from Baramgula to the summit of the pass, which is 8200 feet above the sea.

From this pass a fine view is obtained of the belt of lower hills, about 30 miles in breadth, which intervenes to the Punjab plains, which are there not more than 1000 feet above the sea.

Hugel is incorrect in speaking of the eternal snow of the Pir Punjal range. Towards the end of summer the snow entirely disappears from off the range, although some of the higher points exceed 15,500 feet in height. In Colonel Cunningham's valuable

* Kosmos, Sabine's translation, note 62, vol. ii.

† See Cunningham's "Essay on the Arian Order of Architecture, as exhibited in the Temples of Kashmir," *Journal As. Soc. of Calcutta*, 1843.

work* on Ladák, we find a very instructive section, which shows, that as the mass of land rises, the snow-line recedes higher and higher, notwithstanding the increase of the latitude. In Labah, the country which lies to the east of Kashmir, the line at which all the snow which falls annually melts is elevated 20,000 feet.†

The character of the whole country, which separates Kashmir from the plains of the Punjab, is essentially mountainous, there being scarcely any extent of level ground to be found. Cultivation is exclusively confined to the more open portions of the slopes along the streams, terracing being almost always necessary to keep up the soil and admit of irrigation.

These hills are almost everywhere covered with dense forests and a thick undergrowth of jungle, rendering them imperishable; about 11,500 feet is the limit of forest; above this, a low bushy juniper is the only variety of tree foliage met with.

A variety of pine (*Picea Webbiana*), with birch (*Taxus baccata*), reach the extreme limit of forest. The cedar tree (*C. Deodara*), with a very elegant variety of fir, of great height, and with pendant branches (*Abies Smithiana*), form dense forests from 6000 to 10,000 feet. Below this belt the forest assumes a more familiar face, the various variety of pines, including *P. excelsa*, *P. longifolia*, being mixed up with an occasional oak. *Quercus semicarpifolia*, sycamore, horse-chestnut (*Pavia indica*), and yew (*Taxus baccata*).

I have nowhere seen more beautiful or varied forest scenery than that which clothes these lower hills.

In the low hot valleys, approaching the Punjab plains, a very beautiful variety of wild olive (*O. Zartoon*) occurs, with a species of *Dodonæa*, together with the various kinds of acacia, indigenous to the Punjab: *A. arabica*, *A. modesta*, *A. albispina*.

It would perhaps be out of place here to enter into a detailed description of the geology of the region, some of the physical features of which I have endeavoured to describe; I shall, therefore, but briefly sketch some of its chief geological characters.

I would first remark, that no rock of a true crystalline nature occurs throughout the district I have described.

It has been asserted, that the core of the Outer Himalaya

* Ladák and Surrounding Countries. Allen and Co.

† The following note on the great elevation of the snow-line in Tibet occurs in Dr. Hooker's *Himalayan Journals*, vol. ii. p. 128.

"From the imperfect transmission of the heating rays of the sun through films of water, which transmit perfectly the luminous rays, it follows that the direct effects of the sun's rays, in clear sunshine, are very different at equal elevations, of the moist Outer and dry Inner Himalaya. Secondly, naked rock and soil absorb much more heat than surfaces covered with vegetation, and this heat again radiated is infinitely more rapidly absorbed by snow (or other white surfaces) than the direct heat of the sun's rays is. Hence at equal elevations the ground heats sooner, and the snow is more exposed to the heat thus radiated, in arid Tibet, than in the wooded and grassed mountains of Sikkim."

consists of rocks of a basaltic or sienitic nature; neither of these rocks occur, as far as my investigations extend, and I have examined the localities where they are said to appear. I am disposed to refer the basaltic appearance the rocks locally assume, to igneous action, and to consider them as stratified metamorphic rocks. True gneiss, which forms the prevailing rock of a great portion of the Himalaya, I did not observe.

The mountain mass, which forms that portion of the higher Himalaya which separates Kashmir from the plains of the Punjab, is composed of a vast series of pseudo-metamorphic and crystalline rocks, consisting of schists, quartzites, grits, conglomerates, and slates; these rocks succeed and alternate with each other, and are in places penetrated by quartz veins, and dykes of amigdaloidal greenstone, the whole apparently stratified with a high dip, north to north-east.

When I examined these mountains, I was not aware of the result of the investigations of the brothers Schlagentweit, who have had opportunities, enjoyed by few, of examining a great extent of the Himalaya. These gentlemen state, that they are convinced that there is no real stratification, but only cleavage; produced, as is now generally assumed, by a great tension in the interior of the highly altured rocks.

The great mass of the Rattan Pir, or Outer Himalaya, is composed of rusty-coloured schistose strata, unfossiliferous. The appearance of these rocks strongly recalls to mind the greywacke rocks of Caernarvonshire, which are, I believe, regarded as the lowest of the Silurian system. The dip of the rocks in this range is 30° to 50° in a north-east direction.

The next range, the Pir Punjal, or Mid-Himalaya, is separated from the last by the valley of the Paunch river. Ascending this range from Barangula, we meet with a vast series of micaceous schists, grey and satiny schists, and highly felspathic rocks, thin-bedded with rusty-coloured partings; interstratified with these occur beds of pseudo-volcanic purplish-coloured grits and conglomerates, remarkably compact; large rectangular masses of this rock strew the path on the ascent to the pass; these masses exhibit perfectly clean pastures, the matrix being as hard as the enclosed rocks. These rocks are observed running up to the summit of the range, and continue until the descent on the Kashmir hill commences, where they are covered by coarse earthy roofing slates, unfossiliferous; these again are covered by a rock of a very trappian aspect, having a dark green base, with kernels of quartz. I am inclined, however, to regard it as an altered chloritic slate; it is regularly imbedded with the older strata. The dip of the strata is 30° to 40° , decreasing to about 15° as the valley of Kashmir is approached; the direction north to north-east.

Reposing conformably on these older strata occur a series of fine-grained sandstones, clays, and conglomerates, containing boulders of prismatic rocks; these are undistinguishable from the Miocene strata which flank the Himalaya on the side of the Punjab; with which rocks I consider them to be contemporaneous. This formation tails out for several miles into the valley of Kashmir on its western side only.

Rocks of Miocene age form the entire mass of the lower hills, which intervene between the Outer Himalaya and the Punjab plains: they are doubtless the northerly extension of the Sivalic hills of Cantly and Falkner. I have obtained a large and various collection of mammalian remains, chelonians, and some bivalve shells, from this formation, which has a great development in the Upper Punjab, and in the country beyond the Indus.

I am by no means clear that the remarkable valley or gorge which separates the Outer from the Mid Himalaya, and along the bottom of which the Paunch river flows, does not mark a line of fault, and that, in the upper portion of the Pir Punjal range, we have repeated the rocks met with in the Rattan Pir range; admitting this, however, to be the case, still the thickness of the crystalline rocks is enormous, probably 30,000 feet or upwards. This portion of the Himalaya is so covered with dense forests, that it is exceedingly difficult to observe correctly the relations of the strata, which can be seen only in the beds of the gorges and water-courses in the vicinity of the regular track. When I crossed these mountains, the whole surface of the upper portion was marked by snow.

The rocks which I have described, as forming the Pir Punjal range, extend, in an unbroken band, right round the valley of Kashmir, from the Baramula Pass to the valley of the Sinde river, on the opposite side; and, doubtless, have a still further extension on the northern boundary of the valley, which, however, I have not had an opportunity of visiting.

Some variety of the rocks met with on the side of the Pir Punjal occurs in all the passes which I have examined. On the way to Wurduran I observed felspathic schists, distinctly ripple-marked: the elevation was about 14,000 feet.

I have already described the defile by which the river Jhelum leaves the valley of Kashmir; a magnificent natural section of the Himalaya is there exposed. The mass of mica-schists and felspathic rocks, which are so greatly developed in the Pir Punjal, are here wanting: instead we find compact chlorite slate with quartz veins. About Uri, these are altered by igneous action, so as to resemble some varieties of basalt, or whinstone; this rock occurs regularly interstratified with other rocks. Clay-slate occurs here in all its varieties.

Great disturbance and shattering of the strata is observed, especially about Uri, where the rocks are in a nearly perpendicular position; nor is there any igneous rock visible to account for this disturbance. The dip, for some distance beyond Uri, is very high, but gradually diminishes, as Naushera, at the entrance of the valley of Kashmir, is approached. Clay-slate, or some variety of it, forms also low hills in the valley of Kashmir itself. The Lakht-i-Suliman Hill is an example. The rock is there seen penetrated by veins of amygdaloidal greenstone. The direction of the dip of the rocks is nearly similar on both sides of the valley; it is in general, however, much higher on the east side, and forms frequently abrupt precipices, while the slopes on the western side are in general gentle. The long talus of Miocene rocks, which flanks the older strata on the western side of the valley, breaks greatly the abrupt appearance of the sides of the valley, as compared with its western side, where these rocks are not found.

Regarding the valley of Kashmir itself, the most casual, the most unscientific observer, cannot fail to be struck with the fact, that at one period of its history the valley was covered with water; the marks of former sea-beaches are so distinctly discernible at various elevations, especially along the steep cliffs which border the Wullur Lake; and accordingly we find a very pretty story, invented by the Brahmin priests, of the miraculous way the valley was drained, by the intervention of the gods. The period when the valley was submerged, although geologically recent, was long antecedent to all history; when, in fact, the greater portion of the Himalaya itself was still beneath an ocean.

A vast deposit of alluvium once covered the whole valley, to a height of probably 1000 feet above the level of the Wullur lake. This must have been deposited when the valley was submerged. In channeling out its bed, through this deposit, the river Thelam and its tributaries have, in the course of ages, removed a large portion. About the Wullur lake, which is the lowest part of the valley, the amount removed is greatest. Near Bij-Bihara,* at the higher end of Kashmir, the valley of the river is but 2 miles across, the alluvium deposit presenting abrupt faces to the river 20 to 50 feet in height; it is composed, in its upper portion, of very fine clays of various colours, and, in its lower portion, of beds of conglomerates; it is intersected by the numerous streams and water-courses, which descend from the high ranges on all sides, dividing it into many isolated patches, locally called *Kariwas*; these are richly cultivated, producing the saffron, for which the valley is celebrated.

I procured from this formation several species of fresh-water shells, some of which are of a similar variety to those abundantly

* Or, Vidya Vihara—Temple of Wisdom.

found in the alluvium of the Upper Punjab—*Bulimus Karawarensis*, Hutt, *B. speldus*, *B. pullus*, *planorbis*, *indicus*.

The defile of the Jhelum river, between Kashmir and Mozufarabad, a distance of about 9 miles, is covered to a depth of several hundred feet by a deposit of coarse and fine drift, occasionally interstratified with beds of fine sand.

The river has cut its way down through this deposit to the level of the underlying slate rock, the surface of which has regulated the fall of the river, for nowhere does it appear to have removed the solid rock to any great depth. With such regularity has the river cut its way down through the deposit, that its channel has all the appearance of having been formed artificially.

In this drift deposit occur boulders and angular blocks of granite and other rocks, not found in the vicinity *in situ*; and near Banihār the flat surface of the terrace is strewn with large angular masses of porphyritic granite, many blocks being 30 tons weight and upwards. The nearest point to this locality, where granite occurs *in situ*, is on the opposite side of the valley of Kashmir, a distance of fully 50 miles, for where these erratic blocks are seen: they have, in all probability, been transported by icebergs across the valley, when it was, together with probably a large portion of the Himalaya, submerged beneath an ocean. We have here, perhaps, as fine an example of the transportation of erratics across a broad and deep valley, as the well-known one where the granite of Mont-Blanc has been carried across the lake of Geneva, and deposited upon the flanks of the Jura.* The channeling by the river of its bed must have taken place when the country was being upheaved, and, as we find terraces at different elevations, this action must have been intermittent. These facts all tend to prove the correctness of the view, which has been advanced by an able and experienced observer, Dr. Hooker, viz., "that the entire mass of the Himalaya has arisen from the ocean, and that every portion of it has been subjected to sea action."

It was by the route of the Pir Panjal that the Mogul Emperors passed to spend their summers in Kashmir. In the pages of Bernier, the French physician who accompanied the Emperor Arungzeb, in 1664, we have a lively and graphic description of the royal progress, and of the magnificent cortège which accompanied, consisting of 35,000 horse and 10,000 foot, 70 pieces of heavy cannon, and 50 to 60 pieces of stirrup artillery, as it was called. It is said that a good road across the mountains existed in those days; the route is still called the Emperor's Highway. I scarcely saw a vestige of a road, nor would it appear that any

* See Sir Roderick I. Marchison's Paper on this subject, Journal Geographical Society, 1849.

works of a permanent nature were ever attempted beyond serais; the ruins of several very fine ones are to be seen on the route. "The present dilapidation of these buildings is sometimes adduced as a proof of our indifference to the comforts of the people; it is not considered that where they do exist in good repair they are but little used, and that the present system of government no longer renders it necessary that travellers should seek protection in fortified enclosures. If they are to be considered proofs of the solicitude of former monarchs for their subjects' welfare, they are also standing memorials of the weakness and insufficiency of their administration; add to which that many of the extant serais were the offspring not of imperial but of private liberality."

The British Government has frequently been taunted with the little they have done for the comforts of the people, as compared with their Mohammedan predecessors; and although it is not attempted to deny the great beauty of many of *their* structures, it may be doubted whether the work of the Great Ganges Canal, which fertilizes a whole province, is not likely to prove of more substantial benefit to the people, than all the boasted works of their Mogul masters, during their 600 years' dominion; while the scientific survey of India is as magnificent a monument of civilization as any country in the world can boast of.

III.—*Notes on the Valley of Kashmir.* By Capt. H. H. AUSTEN, F.R.G.S., 1st Battalion, 24th Regiment, Topographical Assistant, Government Trigonometrical Survey, Panjab.

Read, December 12th, 1859.

THE few following observations must be considered merely supplementary to the very interesting and able report by Colonel Waugh, giving a detailed account of the manner in which the Kashmir Trigonometrical Survey is conducted, the area which it comprises, and the high altitudes over which those connected with it have to carry the Trigonometrical net-work. Having been employed on the survey of several districts of that valley, perhaps a few remarks, however meagre, may prove interesting to those present who have never visited that part of the W. Himalaya range. Many general observers, looking at a map like the one now exhibited, however much taken with the drawing and execution of it, the last phase of its existence, as it may be called, may perhaps think little of the immense work—that of weeks, months, and years which it has taken; the altitudes climbed, the long, wearing descents (for, of the two, the last is the most tiring and difficult

when it is continued for any length of time and the slopes great); the days and nights spent in taking observations from the many hundreds of trigonometrical stations; the pages of computation that this afterwards entails in working out the sides of the triangles; the drawing and working up of each plane-table section, and the large number of men who share in the work, from the officers in charge to the native signallers.

To this may be added the minor inconveniences of sleeping out of doors on the frosty summits of these lofty ridges, or running short of supplies. All these may serve to give some idea of the amount of labour entailed in the survey of a country such as this.

In April, 1857, I received orders from the Indian Government to proceed and join the Kashmir surveying party then at Srinagar, in charge of Captain Montgomerie (Engineers), and about to begin its field operations for that year.

The portion of country I was first directed to map lies in the north-western part of the plan now exhibited, and comprised the area drained by the Kahmil river, one of the principal feeders of the Jhelum or the Vedusta, which receives the whole drainage of the valley. This river takes its rise in several branches from the north side of the Kajnag range, which has a mean altitude of from 12,000 to 13,000 feet above the sea. Its other sources lie in the western watershed of Kashmir—in the range separating that valley from that of the Kishengunga river: this latter flows through a tract of country which until lately was entirely unknown, and has not yet been surveyed; it takes its rise near the famous peak of Nunga-Purbet (or the naked mountain), which, rising in icy grandeur to an altitude of 26,000 feet, presents from the Kajnag and adjacent ridges one of the most magnificent and imposing views to be seen amidst this stupendous scenery of the Himalaya.

The plain of Shaloorah is about 5300 feet above the sea. The Kahmil river, as it crosses the plain of Shaloorah, is very rapid, and during the meeting of the snows is quite impassable.

This plain is well cultivated in its lower levels, the principal crop being rice, which is planted out in June and harvested at the end of September. The whole plain is studded with innumerable small villages and substantially-built log huts with peat roofs, which give at a distance quite an English appearance to the country: these are surrounded with walnut trees of large growth, from the fruit of which oil is extracted, and with orchards of apple and pear trees. The white-heart cherries, here called Gläs, are nowhere so fine as in the Utter Pergunnah of Kashmir. The other common trees are the poplar, plane, and elm. Many thousands of acres were formerly under cultivation in this district even on the upper terraces of the alluvial deposit, but the old irri-

gation canals having long since broken away, and the people being at present too poor to repair them, these lands are fast becoming as dense a jungle as those which have never been turned by a plough. Of the same appearance is the beautiful little valley of Lolāb, which gives a feeder to the Kahmil river, with its densely-wooded slopes running down from the Trigonometrical Station of Manganwar, &c.

This country is not ours, and it is perhaps unfortunate for it as well as for us that it was handed over to the Maha Rajah Goolab Singh. Much has been said of late respecting the colonisation of the East. The whole of this district is admirably suited for European occupation, and no part of India assimilates more to a European climate. Had we kept the country, and had British colonies been formed in these hills (a very easy matter), they would have been the means of establishing with greater firmness our supremacy over the north-west of India and in the Punjab. At present there are no roads, there not being such a thing as a wheeled conveyance of any sort in the valley of Kashmir, all produce being carried on men's backs even to the Punjab. Were Anglo-Saxon experience, talent, and labour brought to bear on these lands, they would amply repay the settler, as almost anything might be grown here, and the present crops might be much increased by improved cultivation.

The low alluvial hills between the plain and the main range are covered with dense forests of deodar and other conifers; these, with a few rough roads cut through them, would furnish an almost inexhaustible supply of building material. Here, in the parts lately cleared, Indian corn is the crop generally grown by the natives, who, being goojurs, or shepherds, sow their ground, and and then leave for the hills with their cattle; a few return when the crop is nearly ripe, to protect it from the bears, who are particularly destructive to it: these, descending at night from the hills, make great ravages in the corn-fields; at this time the men who keep watch are obliged to remain out all night, seated on high covered seats, shouting at intervals.

Proceeding from the plains towards the Kajuag range, we continue through forests of deodar until close under the steep ascent, when the *Pinus picea* forests begin, tall, gloomy, and dense, with open spaces here and there covered with a dense growth of *Impatiens rosea*.

Here the shepherds make their first halting-place before the snow should have quite cleared away upon the hills. Higher up, the belt of pine and horse chestnut begins to thin out, and is interspersed with birch and large patches of *Rhododendron campanulatum*, which, when in full bloom, are splendid objects.

About the end of April the shepherds ascend the grassy slopes

and glades about the summits of the ridges, where the pasturage is of the richest description. Higher still thousands of sheep are taken, which are kept solely for their wool, from which the Kashmirians make their strong and warm blankets and other woollens.

The plain of Shulurah, some of the physical and geological features of which have been described in a communication made to the Geological Society, is much higher than that of the main valley, and the lake which once covered it must have been separated from the lake which filled the great valley by the ridge running away from the peak of Manganwar and Margabsunger. The lacustrine deposits in the Shulurah valley are of great thickness and at two distinct levels. Further up the Kahrail river, near its confluence with the Rūngwāri from the north-eastward, is a large mass of debris at a height of 200 feet above the present level of the river, consisting of large, worn, and angular rocks, brought down from above, and deposited there most probably by glacier action.

The axis of the Kajrag range is of granite, with schistose and slaty rocks on the spurs running away from it; towards its western end it becomes exceedingly precipitous and rocky, so that it is very nearly impossible to proceed for any distance upon the ridge itself, and frequent détours of two and three miles have to be made when passing from peak to peak. The most western peak of all, being a slaty rock, was very difficult and dangerous of ascent, on account of the loose stones which keep constantly falling; the weight of the foot often causing whole yards of surface to give way at a time.

The cold on these ridges at the early time of the year when I was on them was very great, making it at times quite impossible to work at the plane-table, or even to set it up, from the high wind which constantly blows from the northward. It was, however, a choice of difficulties, for with the west wind which blows up the Jhelum valley comes all the moisture from the plains of the Punjab, enveloping all the higher ground in a dense wetting mist. From these three causes I had to spend the greater part of May and June, having been kept ten days at a time encamped on the same peak, the only wood which is here attainable being the short twigs of the juniper. On this range the Markore, or wild goat, abounds, and I fancy in no part are more numerous; they are very large, often reaching eleven hands in height, with peculiarly handsome, graceful horns; this animal, so far as we know, has a somewhat limited range, being confined to the Pīr Pinjal, Kajang, and Khagan hills, and in those across the Indus in the Swat country. Of other animals of the Kajrag range, the kustura, or musk-deer, is also common; bears were numerous. The beautiful menāil and other pheasants abundant, and, with red-legged

and snow partridge, afford a welcome addition to the general sameness of mountain fare.

The southern slopes of the Kajmag range are of quite a different character to the northern; now, with the exception of the eastern sides of the spurs, which alone are covered with forests, the whole is quite bare or covered only with coarse grass. Somewhat lower this is mainly of the kind called spear-grass, which, working its way into the clothes, makes walking a torture, as the barbed heads can only be taken out on the inside of the cloth.

On all level spots where the plough can be used excellent wheat is grown, and is considered to be the best on this side of the Jhelum valley.

The villages of this part of the Kashmir valley are mostly situated in the bottoms of the ravines which run down to the River Jhelum, where the rice cultivation commences on the flat alluvial deposits, the fields being all laid out in terraces for the purpose. These alluvial grounds are found at the junctions of all the many rivers with the Jhelum. The mass is composed of the rocks of the main range, mixed up with enormous weather-boulders of granite from the highest peaks.

These alluvial masses must have been formed under water, and the materials carried down by some action (perhaps glacial) from above. The Jhelum river everywhere flows through a deep channel on the extreme end or ridge of the alluvial deposit.



Of this nature are the cultivated spots at Gingle, Uri, and Kuttai; from this I infer that formerly the Jhelum river presented a number of small lakes along its course, connected with each other, and, the river gradually wearing away the barriers between them, these lakes in course of time became drained.

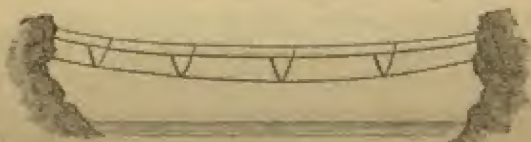
Along the banks of the Jhelum river the forests of deodar commence again, but all the fine timber has nearly disappeared here it can with ease be thrown into the stream, and no steps are taken for preserving the forests. Further from the banks the forests of deodars are dense, and mixed with elm, yew, maple, hazel, ash, and other trees. The Jhelum, from Gingle to Uri, is a perfect torrent, especially near the village of Gingle, where the fall is very great. The rocks in many places appear as if they had been rent asunder or cut through.

The people of this district are very different in appearance to the Kashmirians, and are more nearly allied to the natives of the

Punjab; the Kashmiri dialect ceases to be spoken, and Hindoos are more numerous. There are some very interesting ruins on the right bank, of the same style as those of Martund, Avantipura, &c., built of large hewn blocks of granite. They stand under some high basaltic cliffs, which rise perpendicularly from the river at a distance in many places of only 200 to 300 yards. The scenery here is of the most sublime character, the deodars growing out of every nook and angle in the cliffs, which rise to an elevation of 7000 to 9000 feet, or 3000 to 5000 above the river. At Urie is one of the old *Serais*, or halting-places, built in the time of the Delhi emperors, Jehangir, &c., this being the route often taken by them in their visits to the valley. Other serais occur at Mozufferabad, and are to be traced to the Hazarah country as far as Hassan Abdal, at the place called Wah, and also at Kala-serai, on the present Lahore and Peshawur road.

The temperature of this valley (Jhelum) is much higher than that of the valley of Kashmir during the summer months, from the hills running up at so steep an angle on both sides. Under canvas the heat is oppressive, but the nights are always cool.

The river is crossed in several places by suspension rope-bridges, called *jhuler* and *zāmpūr* by the Kashmirians. They are made of both hide and twig ropes. The bridge is composed of three ropes; the feet rest on one, while the two upper are for the hands; they are kept apart by the forked branches of trees, thus—



At first they are not easy to cross by those unaccustomed to them, swinging about as they do, and, with the river rushing and tumbling about beneath, it requires a good head to make the transit in safety, the footway being often a *single* rope. The natives carry heavy loads over them with the greatest ease. These bridges which are made of the twig-ropes are the best, but they require to be often renewed.

Up the lateral streams are some rich and fertile valleys, with small scattered villages in them. The chief wealth of the inhabitants are their buffaloes. The pasturage in the adjoining hills being very rich, they make large quantities of butter and ghee, which is made by the melting down of the butter. This ghee they send to the plains in great quantities.

As regards the north-eastern side of the valley of Kashmir, and the Wurdwun valleys, or the country below the eastern

water-parting, it may be stated generally that it has much of the same character as the western end. The spurs from the bounding range run out further into the main valley, and the country consequently presents a series of lofty narrow valleys, running up to the northern Pūnjāls. These spurs are all densely wooded and full of the Barāk-singha, or red deer of Kashmere.

On the summits of these hills are fine pastures, where large numbers of ponies are bred yearly.

The marmot, which occurs nowhere in the west of the valley, is here found in myriads, its shrill whistle being heard all over the barren rocks on every side.

There are several pretty little lakes at this end of the valley, at an elevation of 12,500 feet.

The country on the other or eastern side of the main range is called Wūrdwān, and has in every respect a very different character to any part around it.

Being surrounded by mountains which attain a great elevation, it has a very cold climate; the woods are sparse, the trees stunted, and in the upper parts disappearing altogether, the birch being the last to be met with.

The hills are extremely precipitous and rocky. On every side the ravages caused by avalanches descending from the higher regions meet the eye in the form of overthrown trees and transported rocks.

Further up the Wurdwān river, which is tributary to the Chenab, the country in many parts is sealed to man.

It presents nothing but bare rock, and to follow up the different lateral streams is a matter of the greatest difficulty; in many cases it is impossible.

Steep precipices run straight down into the bottom of the valleys, and no animal save the ibex can pass along them. These valleys lead up to the glaciers of the main Himalayan range.

One road leading to the country of Sūrū, or Sūr Būtan, passes over the glacier of Bhūt Khol, which is about six miles in length, with an average breadth of from three-quarters to half a mile, stretching out, however, in some places to a mile and a-half. It is much fissured in some parts of its course, and the scenery on either side is of the grandest character. This glacier is at an elevation of about 13,500 feet, while the mountains rise on either side to 18,000 to 20,000 feet, with slopes often of 5000 and 6000 feet.

A band of eucrinital limestone occurs in Wurdwān, and which also contains a brachiopod shell, which has been referred by Mr. Davidson to the genus *Productus*. Higher the rocks are of black micaceous schist, which, from its crumbling nature, gives a black appearance to the foot of the great Bhūt Khol glacier.

In the inhabited portion of the Wurdwān valleys the villages

are small and wretched. Wheat will not ripen in these regions, and the only crops are of a seed called Tromba.

These people are snowed up for so long a time in winter that their flocks of sheep are small in number, it being difficult for them to feed any large number.

The wild animals are the Ibex, Stag, and Bear. The first of these is found in the wildest and most inaccessible parts of this region, and it is a most beautiful sight to see a herd of these animals going up the steep face of a hill, displacing the loose rocks as they go, which come tumbling about beneath them in every direction.

The remains of large moraines, now many miles from the termination of the existing glaciers, and also at the ends of lateral valleys, which at present have no glaciers at all, serve, I think, to show that the climate of this part of the world must formerly have been much colder than it is now.

The inhabitants of Wurdwān are in every respect identical with those of Kashmir.

IV.—*Notes in Persia, Khorassan, and Afghanistan.* By Captain CLAUDE CLERK, F.R.G.S.

1. *Route from Tehrān to Herāt, viâ Meshed and Toorbut-Sheik-Iam.*

This road, skirting the Salt Desert of Khorassan, lies immediately at the base of the lower ranges of the Elburz mountains. Here and there the road is crossed by spurs of these mountains. The road, after leaving Meshed, bears south and crosses the Afghan frontier somewhere near Koosan, but this frontier is by no means clearly defined; the wandering tribes of Huzurehs and Timoorces, some of whom have settled in the villages about the frontier, bearing allegiance sometimes to Persia and sometimes to Herat.

*Tehrān to Kubūt Gūmbaz, 6½ n. n., 22½ n.**

August 19th, 1857.—Left the city by the Shahabdoolazbeem, or southern gate. Immediately on leaving the city, on the right, is an extensive burial-ground—road across open plain, in parts cultivated, and broken by embankments and cannauts; † the latter are seen in great numbers in the plain all round the

* n. n., Hours' ride. The time occupied in riding the distance, at a walk. n., Miles.

† These appear to the eye as a series of mounds of earth at a distance of about 50 yards apart. By means of a subterranean passage—the excavated earth being thrown up, forming these cannauts, resembling the burrowing of a mole—water is brought sometimes 5 and 6 miles across the plain. In this way but little evaporation takes place, and a stream thus conducted supplies a village for years, which would otherwise be dry in a few days.

city. At the distance of about an hour, the road, bearing south, passes through a large extent of enclosed gardens that surround the holy shrine of Shahablood-lazheem. Water is abundant, and the gardens well cultivated: there is a small village here. On the left, adjoining the gardens, are the remains of some of the ancient ruins of Rhê (the ancient Rhagne): they are situated at the foot of an abrupt termination of a spur of the Elburz mountains; these ruins and mounds are to be traced through the village, and extend some distance into the plain. Leaving the village, the road, bearing *E.S.E.*, winds along the base of some low, bare hills. On the right is an extensive level plain, stretching away as far as the eye can reach to the *S.* and *S.W.*: on it are seen many enclosed villages, and cultivation. There are several tracks or roads across the plain to Kubood Gumbuz: the one nearest the hills is much broken by watercourses, now dry. At distance of about four hours from Shahablood-lazheem, pass on the left ruins of a village; a good stream of water here crosses the road; this and another are crossed two or three times before arriving at Kubood Gumbuz. A ruined village to the right of road; no inhabitants; shelter is found in a small caravanserai; latter part of road very stony; provisions obtainable in a small village distant about two miles from the semi.

Kabûl Gûmbaz to Eiwanekei, 5½ n. n., 19 m.

About half a mile after leaving Gûmbaz, cross the bed of river Jajerood (in winter much swollen by melting of snow; current rapid, with masses of floating ice. Fraser, 20th Dec.). Water of this river finds its way by innumerable channels over the plain, many of them dammed off for irrigation purposes: the stony bed of this river extends about a mile and a half. This Jajerood river is lost in the plain of Vurameen: most of the channels contained water. Road beyond this good, bearing *N.* through level plain; thinly scattered over which is the camel-thorn and other low bushes; no villages or cultivation to be seen: two or three dry watercourses are crossed. At distance of about 4 hours on the right, distant some two miles, are some low rocky hills, named Koh-nimuk: immediately on the left, parallel to the lofty Elburz, is a small range called Koh-Eitug. Gradual ascent to Eiwanekei, surrounded by large extent of walled-in fields and gardens; about 200 houses; water brackish (very). Village on bank of Zamarood; river-bed about 30 yards wide, now perfectly dry: fruit abundant.

Eiwanekei to Kishlak, 4½ n. n., 17 m.

For 1½ hours over open plain; a high mountain to the left front; hills on the right (a spur of the Elburz), close in on the road, and for half an hour by good road through a defile of the hills; these rise abruptly close to the road; parallel to the road a stream of salt water. For distance of 2 miles cross a small level plain surrounded on all sides by hills; in the centre are the ruins of a caravanserai. Then again entering a defile of the hills; this occupies half an hour, road good; the exit from this defile very narrow. In these defiles, called Sirdarah-dara,* the salt stream is crossed several times. These hills running in an easterly direction are a spur of the Elburz range; the road to the end of defile bears *S.E.*, its length I should call about six miles. Enter upon a very extensive plain (the plain of Khar). Only to the *S.E.*†, a long distance off, are some low hills visible; bearing of road across this plain *E.S.E.*: at distance of about 4 hours road crosses a running stream of sweet water. On the right are some small villages, Husseinabad and Killanoo. Kishlak, a small village

* Gardanee Sirdarah. This range of hills connected with the Elburz divide the plains of Vurameen and Khar.

† This is Fraser's description of the river when he crossed it in the month of December.

of some 100 houses; water not very good; cultivation round the village. Post-house for travellers immediately without the village gate.

Kishlak to Deh-i-nimuk, 6 h. n., 21 m.

After leaving the village of Kishlak, the road, bearing *n.*, is through the large plain of Khar; innumerable streams from the Julghoor Hills and Elburz mountains on the left cross the road, many of them 10 to 15 yards broad. Here in the vicinity of road no cultivation; at a distance of 3 hours, near the right side of road, large village of Aredan; about a mile from this a small village, Kadir (or Khar); beyond this the plain as far as the eye can reach, incrustated with salt, no vegetation to be seen. The mountains on the left approach to within 2 miles of the road. On the right, at a distance of 5 or 6 miles, some low sterile hills. None of this region is inhabited. The road good, crossing some dry watercourses coming from mountains on left; general bearing *n.* Deh-i-nimuk, caravanserai and post-house, and ruins of village; some little cultivation; water very brackish; no supplies. The villages on the borders of this salt desert fortified with high walls.

*Deh-i-nimuk to Lashird, 7 h. n., 23 m.**

Road bearing *n.*, over open plain. At a distance of about 3 hours' slight descent, road crossing a ravine, and round the base of a ruin of a fortified village (Goombuz-e-doozd, "the robber's dome," *lit.*): no water in this neighbourhood; soil incrustated with salt. At a distance of about three quarters of an hour road through the ruins of a village (Kheirabad): on the right is a sort of well that contained water, but owing to its disagreeable taste undrinkable. The road is excellent; two very deep ravines (first, the Yelpooria river) are crossed by sound, well-built bridges; beyond these, crossing another ravine by bridge, arrive at distance of 6 hours at a running stream of fresh water that crosses the road; water has a strong mineral taste, but drinkable. Cross some low hills, and, ascending, arrive at village of Lashird: the bearing of road *n.*, good throughout, gradual ascent. Provisions and fruit in abundance.

Lashird to Semnun, 5½ h. n., 18 m.

At a distance of about an hour from the village the road passes one of the fresh-water cisterns; they are often met with in this country; they are covered in with a dome-like roof, and at the side is a small entrance-door: near this is also a stream of good water. At a distance of 2 hours road passes through the village of Surghai (or Soorkhey), famous for its pomegranates and melons. The soil of this plain is very stony; the road, bearing *s.e.*, covered with loose stones, keeps parallel to, and at a distance of about 2 miles from, the Elburz mountains. Plain, slightly undulating. At a distance of 4 hours, on the left, at the base of the mountains, is a small village: the road is crossed by numerous dry watercourses. At a distance of about a mile from Semnun one road branches off for the town; the other, bearing away to the left, skirts the town, passing amongst gardens and cultivation. Water is good and abundant, as also supplies: tobacco much cultivated.

Semnun to Ahoon, 6½ h. n., 22 m.

For the first 3 hours the road bearing *s.e.* over a stony plain, gradually rising towards a spur of the Elburz mountains; this is crossed by a bad stony road, little better in parts than a bridle-path; the road crosses a large vein of slate-rock; near the summit of the ascent is a spring of water, but the supply very meagre: the descent commences at a distance of 4 hours. At the foot cross the bed of a mountain stream† (it contained a pool of water on the road): pass

* This was a night-march, starting at 7 p.m. and arriving at 2 a.m.

† This they said was a cañaut. The spring must have been near.

through a hilly broken country; at a distance of 5 hours pass the ruins of a caravanserai. The whole of this region of to-day's march appears to be totally uninhabited; large masses of conglomerate rock overhang the road: the country appears wholly destitute of water. Abocan, a caravanserai and post-house, situated in a small plain: a reservoir of rain-water; good bread, but nothing else obtainable.

Abocan to Koosha, 5½ h. n., 20½ m.

Shortly after leaving the caravanserai a steep though short ascent; this finishes the spur of the Elburz (the Gurdanee-Abeenayoon) entered upon yesterday. Descent to the plain of Damghan; road stony, bearing generally S.E. and E.; the spur left behind runs in a S.E. direction across the plain; no water or cultivation to be seen: the whole of this region appears totally uninhabited. In the distance, looking in an easterly direction, Dowlatabad and Damghan can be distinguished. Koosha, a caravanserai and post-house; distant a quarter of a mile is an old caravanserai, partly in ruins: a fine stream of water from the Elburz, distant about 5 miles, flows by the place. Supplies are brought here for the use of travellers from a village distant about 5 miles.

Koosha to Damghan (the ancient Hecatomphyon), 5½ h. n., 18 m.

The road, after leaving caravanserai, through open uncultivated plain. At distance of 2½ hours pass the ruins of two villages to the right and left of road; cross stream of water; a short way beyond this some eight villages are to be seen in the immediate vicinity to the right and left of road. On the right is the village of Dowlatabad, well planted with trees; it is fortified with a triple line of wall and ditch; a good stream of water flows across the road to this village: cultivation extends about a mile beyond this. The plain* then wears the same appearance as it did in the first part of march, barren and undulating; a small bush is thinly scattered over it, affording but little pasture. General bearing of road, for the first part S.E., approaching Damghan E., covered with loose gravel and stones. Extensive ruins in the vicinity and town of Damghan; through the town flows the river Cheshmalli, a stream with clear good water: gardens round the town.

Damghan to Deh-mollah, 6½ h. n., 22 m.

Leaving the post-house, which is situated outside, and facing the ancient citadel of the town, the road passes through the bazars of the town; beyond these there are extensive ruins; about half an hour from the post-house the last of these ruins, an ancient gateway, is passed through. The road beyond this very bad, the soil of clay, and in many places crossed by streams of water. At a distance of 2 hours pass on the left ruins of a village and fort called Tappa-Bukker; at half an hour from this a small village on the left: general bearing of road E. by S. At rather more than 3 hours from Damghan a line of caravans crosses the road, and lead to a village immediately on right of road called Mahmandost. The plain about here is covered with gravel, and a small bush is thinly scattered over it, affording but scanty pasturage; it is crossed by several lines of caravans, coming from the base of the Elburz, and leading to villages in the plain: several are to be seen in this plain, which stretches away to S. and S.W. as far as the eye can reach. Pass on the left the village of Kadirabad; cultivation to some extent round the villages: Deh-mollah, a village with ruins, and surrounded by gardens; it lies to the right of main road.

Deh-mollah to Shahrood, 3½ h. n., 13 m.

Road over undulating barren plains, very stony and uneven, owing to the numerous watercourses that cross it—now all dry. Several small villages are

* Some five miles to the right across the plain several villages are to be seen.

seen on the right of the road; water is conducted to them by means of long lines of canals, commencing at the foot of the Elburz mountains: but little verdure on the plain. Bearing of road s.e.: it gradually approaches the Elburz range, at foot of which is the town of Shahrood, surrounded by gardens and cultivation.

"From Shahrood there are two routes to Astrabad. The first, by Koshlook, is 18 fursuks; it is the best road, though, owing to plundering bands of Turcomans, considered unsafe. The second is by Ziarrut, 16 fursuks, very hilly and bad: the two roads join at a distance of about 30 miles from Shahrood. 2 miles, Shahrood side of Ziarrut, difficult pass over the main range of the Elburz mountains in wet weather; owing to soil, laden mules progress with difficulty: in dry, guns might be taken over it with labour."—(Conolly).

Astrabad about 70 miles in a direction s.s.w. from Shahrood.

*Shahrood to Meyo-meed, 13½ n. n., 39½ m.**

At a distance of an hour and a half, the road, being over an open plain, passes on the right the village of Budusht; road crosses by a small stone bridge a stream of water that irrigates the gardens and fields around the village: at rather more than an hour from this pass the ruins of a village, Kyrabad, with water; road good, bearing s. over open desert plains. At a distance of 3 hours from the ruins of the village just mentioned are the ruins of a caravan-serai, and a reservoir of fresh water (we passed this after nightfall). The country beyond this becomes more hilly and some more ruins are passed on right of road; the Meyo-meed mountains are seen to the right (the highest with large rounded summit); in the plain immediately at the foot of these, through which the road passes, are some small villages. The village of Meyo-meed, with high walls, caravan, and post-house, is situated at the foot of the round-topped mountain: a stream of water runs through the village; water is brackish, and that in the reservoir is unfit for anything except washing, and scarcely for that.

This march is considered unsafe owing to the marauding tribes of Turcomans; they frequently plunder caravans, and yearly carry off hundreds of men, women, and children to the slave markets of Khiva and Bokhara.

Meyo-meed to Meandusht, 7½ n. n., 22 m.†

The road at first crosses the plain at the foot of the Mai-o-mai hills. An hour distant from Meyo-meed pass on the left the village of Ibrahimabad; ‡ cross a stream of water: an hour from this is Killa-zaidr, with a stream of good water. The hills on the right approach the road, and immediately after leaving the fort on the left the road enters them; the hills § stony and thinly covered with bush: road, general bearing s. and s.s.e., in places stony; no vestige of cultivation or water. Passing through these hills occupies rather more than 3 hours; the road then enters an extensive barren plain. At a distance of about 1½ hours from the hills is the caravan-serai of Meandusht; water brackish, caravan-serai ¶ partially in ruins; the water is obtained from a reservoir just outside the serai. This place must be some 500 feet higher than the plain of Meyo-meed. Supplies scanty.

* This stage we travelled at caravan pace, keeping with the baggage. The country about here not being considered safe, caravans are accompanied by a field-piece and an escort of horsemen. This was a night-march, starting about 5 p. m., and arriving 7 a. m. In the saddle, exclusive of stoppages, 13½ hours.

† Travelled with baggage and caravan.

‡ From this a road branches off to Duagird to right of road.

§ These hills are said to be the haunt of plundering Turkoman tribes.

¶ Close on the left of the serai is a small walled village, square, and bastions at angles. It contains about sixty dwellings.

"A caravan that had preceded ours had been plundered on this march by the Turcomans. Some large cases containing mirrors for the holy shrine at Mushed were lying broken, and contents smashed, by side of the road: the people with the caravan were for the greater part carried off for the slave-markets of Bokhara."—(*Journal*).

"The caravan we travelled with must have numbered at least 1000 souls. There were constant alarms of Turcomans, but we saw nothing of them."—(*Journal*).

*Meandusht to Abbasabad, 5½ h. n., 19½ m.**

For the first hour over a desert plain: the road then enters some low hills, similar to those of yesterday, bearing s.e.; generally speaking a good road, though in some places stony and covered deeply with a fine gravel. At a distance of rather less than 4 hours, pass on the right the walled village of Elbuk (or "Albak," caravanserai); there is a stream of water here. After leaving this, at a distance of a mile and a half the road leaves the hills, and bearing n. strikes across a desert (salt) to the right, stretching away as far as the eye can reach. The village of Abbasabad is situated about 1½ hours from the hills passed through in the morning, and at the edge of the salt desert: water is good here, and there are some gardens. The village is built somewhat similar to that of Lengird, and contains about sixty families. No corn of any kind appears to be cultivated in this region: the supplies for the village and travellers are brought from Subzawar and Muzenan.

Abbasabad to Muzenan, 6 h. n., 22 m.†

The road over open desert plain. At distance of 2 hours cross a stream, over which there is a brick bridge, called Pool Abreeshtin: the ford is immediately to the right; water at this season in a pool only, no running stream. At half an hour from this to the village (fortified) of Sadirabad, stream of brackish water crosses the road: no cultivation. At about an hour from the village to the left of road a covered well containing water: the right of the road is a sea-like expanse of soil, thickly encrusted with salt; nothing to be seen upon it but a few bushes of the camel-thorn; it stretches away to the s. and s.e. without a break. A region entirely uninhabited till near Tubbes and Yezl. At distance of about 4 hours some low stony hills approach the road. At distance of 5 hours pass on the left a village with gardens; soon after this cultivation is to be seen on both sides of the road. On the left pass the enclosed village of Bahminabad, on the right Shawee; the road passes beyond these villages through the extensive ruins of Bahminabad, a small portion of which appears to be still inhabited; two or three small streams of water cross the road. Arrive at village of Muzenan on the right, with a serai, and ruins of an old one: water good; gardens and cultivation, though to no great extent: 150 houses.

Muzenan to Mēhir, 4½ h. n., 18 m.

The road bearing n. by s. across open barren plain. At distance of about 4 miles pass on the left the village of Dourzan (Daurzan), situated under the hills about 2 miles from the road. At 2 hours distant from Muzenan, pass on the left a covered well containing water (not very good); the road easy and good throughout: to the s.e. in the distance across the plain are seen a short range (one with sharp conical summit) of mountains; they are called the "Magheza;" beyond these again a very high range, to be seen before sunrise. At distance of 3½ hours pass through the small village of Zoodkhar; around this cultivation. From this village one hour to Mēhir, across open plain: post-house and ruined serai, the latter distant some half-mile from village; gardens and cultivation.

* Half the distance travelled with caravan.

† One of the districts of Subzawar.

*Mêhir to Subzewar, 8 n. n., 30 m.**

The village of Mêhir lies about a mile to the left of the road: the serai is on the main road. Leaving the post-house, which is inside the village, by bridle-road for a mile to the main road, at distance of 2 hours a road branching off to the left goes to the village of Behwund, and rejoins some 3 miles further on. At distance of 3 hours the road passes the fine serai of Behwund, standing entirely by itself; the village is some distance to the left: the road good throughout, bearing *s.*, over slightly undulating barren plains (this was a night march). About an hour from the serai pass a stream of water, and near this a covered well. At distance of 7 hours on the left † are ruins—one large column, &c.; also the village of Kusroogird: cultivation to some extent, several cotton-fields. One hour from this the town of Subzewar, surrounded by wall and dry ditch. Road latterly much cut up by watercourses, both dry and wet.

"The column on the left, passed in to-day's march, has inscriptions in the cuneiform character: the inhabitants, beyond calling it 'kndeem,' ancient, made no attempt at giving any sort of account of it."—(*Journal*).

Subzewar to Zafferoonie, 5 n. n., 20 m.

The road leaves the town by the *s.* gate, across level plain: pass by several villages (5); the principal one Nuzzeloodad (Nurzoolebad), distant 2 hours from Subzewar. Cultivation is to be seen round all these villages, and water seems abundant. At distance of about 4 hours on the left is a covered well: road excellent throughout. Bearing *s.*, Zafferoonie, a small walled village with a little cultivation; close to it is the ancient caravanserai of the same name; ruins show it to have been a fine building: supplies scarce, water indifferent.

Zafferoonie to Shooreab, 4 n. n., 16 m.

For the first hour by a good road across level plain: pass on the right a ruined village; from this gradual ascent, and at 2 hours' distance, pass on the right the village of Sung-Killeedar, with ruined caravanserai: the road immediately beyond this village enters the hills of the same name. On the left, following the course of the road for upwards of half a mile, is a fine clear stream of water (the road on the left bank). The hills about here present a bare and rocky appearance: the road stony and broken in places, owing to large stones and rocks that have fallen over it. At distance of 3 hours, of two roads, the right is taken to Shooreab. At distance of about 5½ hours there are some springs of water to left of road: the hills are here less stony, being covered with small bush and grass, and in a small valley to left of road a little cultivation is to be seen; these hills have a general direction of *s.w.* and *s.e.* The road, latter part, is good, over alluvial soil. Descend to uneven broken plain, in which is situated the small village of Shooreab, with a little cultivation; water good.

Shooreab to Nishapoor, 5½ n. n., 21 m.‡

The road for rather less than an hour stony; crossing some low detached hills, enter an extensive level plain, and at distance of 2 hours pass on the left on the road the small village of Surleh: the road good over clay soil and bearing *n.* At distance of rather less than 3½ hours pass on the left the ruined, and a short distance further on to the right of road the inhabited village of Hassan-

* Subzewar province, containing nine districts,—Subzewar, Muzrenoon, Kan, Keirrao, Zammend, Tabbas, and three called Koo-Meesh.

† A bed of a river crossed, now dry.

‡ This valley of Nishapoor has a breadth of from 15 to 20 miles. The province contains twelve districts,—Nishapoor, Durb-e-lauzee, Manzool, Revand, Zeghankoo, Baur-e-mandun, Durrond, Ishkabad, Belook-i-nau, and three others.

abad; cultivation about here. Beyond the village two rivines are crossed, one with steep banks; both were dry. Approaching Nishapoor, several villages and gardens are seen to the right and left of road. The plain in which the town is situated is fertile and well watered. The climate is spoken of as the finest in Khorassan; it is also celebrated for its fine fruits: contains about 3000 houses.

Nishapoor to Dahrood, 4½ n. n., 16 m.

Leaving the town by the eastern gate, the road passes over a plain covered with villages, gardens, and cultivation: the soil fertile, and well watered from the high bare hills that run parallel to the road and at a distance from 3 to 4 miles from it; they are called the Meerabee, and further on the Khaoul range. At a distance of about 3 hours a road branches off to the right; this is the road to Mushed via Kademgah and Sheriffabad: this road is the easiest, but some few miles longer than the one via Dahrood, which crosses the hills; the general bearing of the road to this point s.e. In the country about here fewer villages are seen, and the plain presents a sterile appearance compared to that just passed through: several dry watercourses with large beds are crossed. The road, covered with loose stones, bears e., and crosses some low hills at the foot of the Meerabee Mountains, and at the distance of about 4 miles arrives at Dahrood, situated at the foot and at the mouth of a gorge of the Meerabee. The village is surrounded by gardens; fruit of all kinds abounds. Dahrood is in the district of Nishapoor: this district, containing some 100 villages, returns a revenue of 40,000 tomans yearly.

*Dahrood to Toorukbay, 7½ n. n., 22 m.**

The village of Dahrood is built in the gorge and on the slopes of the hills; it contains from 500 to 600 houses: some fine trees are seen in and about the village, the plane and beech principally. The road,† bearing s.e., ascends by the banks of a fine clear stream of water: for a distance of rather more than a mile gardens extend, also vineyards; beyond these the banks of the stream are thickly planted with the willow, poplar, beech, mostly pollarded, &c. The gorge gradually contracts, and from the road, which is covered with loose rocks and stones, the mountains on either side rise precipitously; many landslips from these large rocky masses have fallen across the road at different periods. At distance of 2 hours is a small ruined caravanserai; from this to the summit the ascent is very steep, occupying about half an hour: at the distance of rather more than an hour down the s.e. side is a small ruined serai. Slate rock abounds this side of the mountains, but rarely stratified with quartz (of which so much is seen in the Elwund): on this side in the hollows some small bushes and verdure are seen; on the Dahrood side the mountains are perfectly bare. At distance of about 2½ hours from the summit is an open spot on the banks of a fine stream of water, with trees; this is as nearly as possible half way between the summit and Turgoveh or Toorukbay. Beyond this the road crosses and recrosses the stream several times; the banks of the stream are planted with birch, beech, poplars, plane, &c.—some of fine growth: the road very bad, covered with loose rocks and stones, frequently lying over masses of rock, in which steps have been worn by the passing caravans. At distance of 2 hours from the open spot pass through the village of Jagherk: around this the gardens abound in fruit of all kinds; cultivation is also seen on the sides and in the valley. A short distance from this the road passes through the village of Auberan, and, ascending a small ridge on the left, descends into a narrow valley destitute of trees, but in which some cultivation is seen. Through gardens approach village of Toorukbay; water good, and fruit of all kind abundant.

* To the top of the pass of Dahrood 2½ hours' ride—about 8 miles.

† This road is, in winter, impassable, owing to the heavy drifts of snow in the gorge.

Toorukbay to Meshed, 3½ n. n., 12 m.

Passing through the enclosed gardens of the village, the road crosses the ridge on the left, leaving the fertile valley travelled through in yesterday's march on the right. Further down than Toorukbay is the village of Gulistan, built on the summit of a hill: * it lies about a mile to the right of the road. At distance of three quarters of an hour, the road, crossing a billy barren tract of country, passes by a garden with trees and water: † just beyond this the road crosses the wide stony bed of a river; its current from right to left; a little water in the bed. At distance of about half a mile to right of road there appeared to be some sort of dam with lock built across the bed. Steep ascent up bank of river: from this the road descends and leaves these mountains, by a very bad stony bit of road; enter an extensive plain cultivated on both sides of road; numerous lines of cannauts stretch across the plain, in which several small villages and forts are seen. Road good, bearing e. Enter Meshed by western gate across dry ditch.

Meshed to Sungbust, 7½ n. n., 19 m.‡

Leaving by the Bedgar gate (s.w.), the road, passing some burying-grounds and enclosed gardens, at a distance of about half a mile, enters an extensive plain, cultivated near the precincts of the town. To the left are several small towers § scattered over the plain; at distance of half an hour pass a covered well: on the right are the rocky sterile range ¶ that bound this plain on the s. and w. At distance of three quarters of an hour is the walled village of Askeria; it contains a few inhabited houses and a well of water outside: at 2 miles distant from this are the ruins of a caravanserai and mosque; stream of good water. One mile to the left of road is the village of Tooruk: cultivation extending some distance into the plain. General bearing of road s., good. The hills on the right approach the road: beyond this the country, leaving the level plain of Meshed, enters a country undulating and barren. At distance of about 13 miles is a covered well with good water: road crossed by several large ravines and watercourses, all dry. On the right bank of a small stream is the village of Sungbust, containing some 10 or 12 houses; there is a well containing good water, that in the stream is brackish (animals drink it).

"The gates of the village were shut, and we were warned off, as the inhabitants were suffering from cholera."—(*Journal*).

Hard frost during the night, with a keen cutting wind (29th September).

Sungbust to Feriman, 8 n. n., 18 m.¶

Road bearing s.e. through an undulating barren country. On the right a range of rocky mountains, a continuation of those that bound the Meshed plain: road good throughout. At distance of about 13 miles on the right are ruins of a village, there are also some ruined cannauts. No water to be found in any part of to-day's march (a dry river-bed crosses the road and runs parallel to it

* Boiling-point of water 206½ deg.

† "In this neighbourhood, on both sides of the road, numerous camps were seen: they belonged to portions of that force that had been withdrawn from Herât a week or so previous to our arrival. Numbers were daily dying of cholera."—(*Journal*).

‡ This march travelled with camels, keeping with them throughout, pace averaging little more than two miles an hour.

§ These towers are built as a protection against the Turcomans: they have a small hole at the base, allowing one man only at a time to enter.

¶ They have no name—the villagers calling them by the name of the villages near.

¶ Camels took eight hours.

the first 2 or 3 miles). At distance of 3 miles* from Feriman enter upon a perfectly level extensive plain, bounded by some high rocky mountains on the south and west. Feriman, a village containing 300 to 400 families: water good, a little cultivation, supplies obtainable. (30th September.—Water froze here before sunrise on being thrown on the ground: in our basins, outside tent, ice a quarter of an inch thick).

Feriman to Boordoo, 10½ H. R., 23 M.

Road bearing due N. across same level plain entered yesterday, turning abruptly S., approaches the small village of Kalunderabad (distant about 8 miles from Feriman) at the foot of the mountains: cultivation and gardens. The road beyond this bears S.E. across an undulating barren country: half way from Kalunderabad to Boordoo a small stream of water crosses the road; the mountains on the right are thinly covered with wood; cross several high ridges; road stony and broken. Cross large dry bed of river; on opposite bank the small fortified village of Boordoo: water good; a little cultivation around the village; supplies scarce.

Boordoo to Mahmoodabad, 8½ H. R., 18 M.

Over undulating plain; road stony, bearing S.E. About 7 miles to small village of Abdoolabad; gardens and cultivation, good water. Beyond this the plain level; it has an average width of about 10 miles, bearing S.E.; a few ruined villages are seen scattered over it. On the left, at distance of about 5 miles, is the now ruined village of Kyrabad (formerly the road passed through this village); it has been plundered, and lands laid waste, by Turcomans. Road passes through the extensive ruins of Shair-Linga, occupying some 4 or 5 square miles: the modern village of Linga is immediately on left of road. About half a mile from this, Mahmoodabad, on left bank of a fine stream: broad bed and high precipitous banks. Supplies scarce.

Mahmoodabad to Toorbut-Sheik-jam, 6 H. R., 13 M.

Road bears S., skirting some low hills on the right: plain perfectly barren and stony. On the left, at distance of 3 or 4 miles, is the river on which Mahmoodabad is situated: before arriving at Toorbut the water is drawn off for the purpose of irrigation: the bed, distant from Toorbut about 2 miles, is perfectly dry. Toorbut has several gardens, and there is some extent of cultivation; it contains about 200 houses. There is a handsome mosque here, in ruins.

Toorbut to Karez, 13 H. R., 30 M.

By level road across open plains, bearing S.E. At distance of 8 miles pass on the left a covered well, containing water: rather more than half way is the ruined village and serai of Abbasabad; no water here. The road, beyond this good, crosses the dry bed of a river, the Mosinabad, a tributary of the Herat River (for some distance the Mosinabad keeps to the left of road); cross a low ridge of bare hills, then over open plain to Karez; little cultivation, contains 100 houses, water good: extensive ruined serai at back of village.

Karez to Kossan, 9 H. R., 20½ M.

Open level plain, thinly covered with brush and shrub; clayey soil, which in wet weather is very deep and heavy. At distance of 3 hours ruined village of Daghestan; 7 hours' distance, ruined serai and village of Kafirkilla. About a mile to the left from this village is the bed of the Herat river: wooded and jungly: water is found in some parts. Cross river, and about 2 miles along

* About four miles to right of road, under the mountains, is the village of Ahmedabad, with gardens and trees.

opposite bank is the village of Koozan. The greater part of the village is in ruins, as are also the wall and towers; some good gardens enclosed around the town: water good. Village contains about 200 families: many of the former inhabitants taken into slavery by the Turcomans.

Koozan to Ghorian, 10 n. n., 25 n.

Road, skirting some low bare hills, follows at first the course of the Herat river: in the bed are trees and jungle. At distance of 4 miles ruined serai of Teerpool, near which is a ruined bridge over the river: at distance of about 11 miles the road, crossing a hilly bare country, passes the ruined village and serai of Shubbus. Beyond this the road leaves valley of river (which here makes a large bend to the south), and crossing a plain, eventually passes over to the other bank of river, which here has a good stream of water. Village of Zungheer-Sawar: beyond this cross extensive level plain, and at a distance of about 6 miles is the town of Ghorian, with gardens. Plain extensively cultivated, and several forts are to be seen scattered over the surface.

The old part of Ghorian is passed on the left; now in ruins. The whole of the rich country around this had been laid waste by the Persian Sirbaz (troops).

Ghorian to Zindajan, 5½ n. n., 12½ n.

Road across level plains, bearing e.; country well watered and extensively cultivated. To the left of the road is the populous village of Bernabad: this village is on right bank of river (Herat). The country intersected by large and deep watercourses. Zindajan, a village surrounded by a high wall, gardens, and fine vineyards; contains about 1000 houses.

Zindajan to Herat, 23 n.

The road bearing e. across a plain irrigated by large watercourses. Several villages are seen from the road; around them the land well and extensively cultivated. At a distance of about an hour the plain is somewhat broken, and the distance from the mountains on the right to those on the left is about 12 miles. At distance of about 9 miles cross the Herat river* to right bank: the stream here has a current of about 4 miles an hour, and at this season is about 3 to 4 feet deep. At distance of 2 miles from the river, small walled village of Sungbust: distant an hour from this is the village of Killa Eedgar; water abundant. The mountains on the right end abruptly: not far from this is the small village of Abjeleel, to the right of road. Numerous canals irrigate the country, some of them deep, and crossed by narrow unsafe bridges. At distance of about 5 miles from Abjeleel cross a large stream coming from the right; this flows into the Herat river a little below Sungbust: a large village, Nookra, is passed on the left. The road, a good deal cut up and broken by cultivation, enters the suburbs of the town: gardens enclosed by high walls; at about 300 yards from the southern gate an enclosure with mosque. Enter by Trak gate.

"Arrived second week in October."

2. Route from Herat to Shahrood, via Khaff and Toorsheez.

This road leaves the Herat Valley at Ghorian, and then strikes into the Salt Desert of Khorassan. Owing to the great scarcity of provisions and water, and also from the country through which it

* The bed of the river has low jungle of camel-thorn and tamarisk.

passes being considered very unsafe, owing to plundering Turcomans, it is a road very little travelled. The inhabitants of the few villages we passed through appeared to have no recollection of having seen Europeans. I believe this was Forster's route in 1783.

*Herat to Zindajan, 24 м., 13½ с. н.**

Road leaves Herat by Goortschak gate, and, passing by ruins of Masella, points straight to the hills for about a mile, then, turning abruptly to the w., skirts the hills that bound valley on the n. side. At 4 miles passed small village of Meerferoosh; 4 miles beyond this Killa Kashee; provisions scarce; road excellent over light gravel soil. The villages of Sak-Sulman and Shaloo-petree are passed on the left. About 8 miles from Kashee road crosses the Herirood to the left bank. Zindajan contains about 1000 houses; provisions of all kinds abundant. In winter the upper road, although a little longer, is preferable to the lower, which is across alluvial deep soil. A snow-storm detained us here a day.

To Ghorian, 13 м., 6 с. н.

Road and soil similar to that of yesterday, along the banks of river; distant some 2 or 3 miles to the right, extensive cultivation; the upper part of valley through which the road lies barren and uncultivated.

Ghorian to Hons-e-sung-dochter, 21 м., 9½ с. н.

The road leaving Ghorian crosses a small canal, the water in which is brought from the Herirood for irrigation purposes; the road then strikes in a north-westerly direction across an extensive plain, which for a distance of 5 or 6 miles bears the appearance of having been at some former period—some 4 years ago—under cultivation. The soil is of light gravel and sand, the road excellent; plain covered with small bush and shrub, and broken here and there by dry watercourses. At distance of about 14 miles, after slight ascent, enter some low, bare hills; road stony for about 3 miles through hills. An extensive barren plain then opens out, and crossing which arrive at a large stone well at a distance of about 4 miles from hills. On the left is a conical peak called Sung-e-Tochter; the water is good, and firewood abundant, but no building of any description affords shelter. About 2 miles short of Hons-e-dochter are some ruins and a well; the latter is also ruined, and holds no water. The water at our encamping-ground was rain-water, plentiful; it is said to remain throughout the summer sufficient for the few caravans that pass this road.

Sung-e-Dochter to Karat, 30 м., 14½ с. н.

Road over undulating plain; soil similar to that of yesterday. Some low, bare hills passed on the left shortly after leaving encamping-ground. These mark the frontier between the Herat and Persian territories. These are supposed to be a favourite haunt of the Turcomans. Beyond these the hills recede from road, and are at a distance of about 4 and 5 miles. At 11 miles arrive at some ruined wells; no water. About 2 miles on the right, near the hills, it is said there is a spring, but it is salt. "A party of marauding Turcomans crossed the plain some 4 miles to our front: our party gave chase, but it only resulted in the capture of one Turcoman, whose horse fell with him. The first of our Afghans who got up to him immediately stabbed him; the rest of the Turcomans, being well mounted, escaped, but not before they had

* с. н., Hours occupied by our camels from one stage to the other. Left Herat on 1st March, 1858.

found themselves obliged to abandon all the camels which they were driving off, and some of their spare horses. Both camels and horses were hamstringed before they abandoned them."—(*Journal*.) The plain about here broken and covered with bush and shrub. On the left are ruins of an old fort, distant some 2 miles from road: the soil of the plain is much encrusted with salt; and a few pools of rain-water passed here and there were so brackish that the cattle could not drink the water in them. At distance of about 28 miles arrive at the foot of some low hills. On the right is a minar of stone and arabesque ornaments. About 2 miles to the right is the ruined village of Karat, destroyed by Turcomans; the whole of inhabitants carried off. During the whole of to-day's march no water is obtainable, and no habitation of man is visible from road. The road enters the hills, crosses the dry bed of a mountain stream, on the bank of which is a ruined serai and well; the latter contains no water. By stony road up the banks of bed; at distance of 2 miles arrive at water; firewood abundant; ground confined for encampment.

Karat to Khauff, 24 m., 11 c. n.

Stony road through hills along banks of stream: in bed high grass and jungle; water good and plentiful. At distance of about 6 miles pass a stone turret on left of road on summit of small hill. Snow still remained on northern side of banks and hills close to road. The wheel-tracks of guns, on their return from late siege of Herat, still visible in parts of road. 7 miles, highest point reached after gradual ascent. From here watershed to westward; the road before reaching rather heavy owing to melted snow. At about 14 miles road debouches on extensive plain, with gradual descent to town of Khauff. Some distance on left a dark line of fir-trees conceals the village of Sungoon; under the hills is Baroobad; near Khauff is Kargird. Khauff situated at foot of bare hills; town walled, and with ditch and citadel; water from cisterns in hills; contains about 500 inhabited dwellings; gives 200 men to serve in the army of Persia; revenue about 500*l.* yearly; governor a Timoorce, by name of Hasson-Ali-Khan. About 5 miles short of Khauff the road is crossed by a fine stream of water coming from the hills on the right.

Khauff to Nassirabad, 23 m., 10½ c. n.

The gardens of Khauff extend some distance along left of road; distance of 3 miles unfinished fort on left of road: beyond it, at the foot of the hills, inhabited village of Looj; road crossed by line of ruined cisterns. At distance of 4 miles a good deal of cultivation on both sides of road, irrigated by a fine stream coming from mountains on the right; these latter are some 4 or 5 miles N. of road, running in a direction nearly N. and W. On the right, lying some 3 or 4 miles under the mountains, are the villages of Gisht, Serab, and Poindar. At distance of 6 miles, *hous* (a covered well) with good water: the road bears W. across a plain thinly covered with bush; soil of light sand and gravel. On the right are some low hills detached from the higher range behind: in these are the remains of an ancient dam confining the water of a stream. Near the dam village of Killa-nau, visible from road; the plain here and there slightly encrusted with salt. At 10 miles pass another *hous*; 4 miles beyond this, village of Salama, with double wall and ditch; the ruins of a large town outside the present walls. Just beyond this village ancient ruin to left of road; cultivation extensive, in which are small forts and towers to protect the cultivators against attacks of Turcomans. The plain beyond Salama crossed (at this time of year, March) by several fine streams of good water: 4 miles from Salama road crossed by bed of river; river fordable in all places. This river comes from mountains on the right, and by some called Seedee: road passes on the left small village of Furrabad, and arrives at Nassirabad, a fort with wall and ditch, containing some 300 houses.

Nassirabad to Sungoon, 27 m., 12½ c. h.

For 2 miles over alluvial soil to village of Chamunabad; on the road large hons with water; gardens and cultivation on both sides of road. 5 miles villages of Mehdeebad, Esan, Khance. Extensive ruined town to right of road; beyond the village a good deal of cultivation. To Mehdeebad from Nassirabad soil alluvial and much encrusted with salt. 8 miles, village of Jelirabad: lines of cannauts run parallel to the road, and several others in different directions; beyond Jelirabad soil of light gravel and sand. 2 miles from Jelirabad small village of Mulka lying to left of road; from hence the road, crossing a well-cultivated plain, passes the small village of Hoosseinabad on the right, and arrives at Kooshear, a large village, with extensive ruins around; village fortified with walls and ditch. This place about half-way of to-day's march, bearing in a s.w. direction across undulating plain; pass on left small hamlets of Assabad, Roodkhir, and Jaffirabad, the latter considered half-way between Kooshear and Sungoon: gradual ascent to Sungoon; road crossed by several streams of good water coming from the right. Sungoon, with wall and ditch, contains about 400 dwellings: citadel in ruins.

Sungoon to Zarmir, 28 m., 13 c. h.

By bridle-path across cultivation for a mile, bearing w. At 2½ miles cross river, 15 yards broad and 2 or 3 feet deep; contains water throughout the summer; named here Sungoon river; comes from a village to the s. called Zamel. From Sungoon there is another road to the left—the soil alluvial—whereas the one we took was of sand and gravel, and better for laden camels. 5 miles, arrive at Mahmoodabad, a small village with wall and ditch; from this the road, bearing s.w., approaches the hills that bound the plain on the n. 8 miles, village of Hindebad; road from this crosses undulating barren plain, bearing w. 12 miles; well with water; low, bare hills on both sides. From well a very gradual descent, and, bearing slightly s. of w., the road turns towards a high rocky range, now covered with snow, running e.s.e. and w.s.w. 14 miles, pass small villages of Killa-nou, Hosseinabad, and, further back, Zaffierabad. 15 miles, small covered well with rain-water: road crossed here by large beaten track from Turbut to Tabbes. 16 miles, to right of road, under the hills, small village of Kujdaracht. 24 miles, cross broad bed of river with high steep banks: this river flows by Toorbut, and, after crossing road, waters the Mawalat valley, spoken of as being very fertile and highly cultivated; water in considerable volume, about 30 feet broad, and up to the horses' bellies: plain beyond this undulating, soil of sand and gravel. Zarmir, small village; provisions scarce.

Zarmir to Toorsheez, 26 m., 12½ c. h.

5 miles w., across plain to small village of Aliabad, nearly deserted, with strong walls and ditch. 2 miles from Zarmir cross a small river coming from hills on the right. 5½ miles, road crossed by mountain torrent, in summer said to contain no water, the banks steep and high: current very strong, the water a little above horses' knees. 9 miles, small covered well with water. On the right, at foot of the mountains, 4 miles from road, village of Askun. 12 miles, another small well with good water; cultivation on both sides of road; plain undulating, and soil of gravel. 19 miles, road crossed by stream, coming from the right: this marks the boundary between the districts of Khauff and Toorsheez, and irrigates a considerable portion of the latter; plain covered with ancient and modern lines of cannauts. Cultivation considerable approaching Toorsheez, passing on the left village of Fidavi. General bearing of to-day's march w.

"District of Tooraheez returns a revenue of 18,000*l.* (9000*l.*) yearly (probably exaggerated). The governor, Abbas Khan, is a Kajar—the name of the royal tribe."—(*Journal*.)

Tooraheez to Khalirabad, or Kholeelabad, 9 m., 4½ c. n.

Road bearing w., and inclining towards high rocky mountains (the same range that ran parallel to road in yesterday's march: this range called by some Koh-e-seed, by others Koh-e-sureh), passes through, at the distance of 3½ miles, small village of Dust Shano; beyond, through gardens and orchards enclosed by high mud walls, to the right, are two or three small hamlets and ruined remains of a village. 7½ miles, small walled village of Deb-e-non: three covered wells with rain-water on the road between this village and Tooraheez; road crossed by line of cannauts, and watercourse with steep banks. 9 miles, village of Khalirabad: on the right ruined walled village; the present inhabited one on the left contains some hundred dwellings; general bearing of road to-day w.; soil principally gravel and sand; cultivation to be seen on both sides of road throughout to-day's march. On the right, extending to the base of mountains* that bound the plain on the northern side, the plain has here a breadth of some 10 or 12 miles, and to the s. is bounded by sterile rocky mountains.

Kaleelabad to Anarbat, 23½ m., 9½ c. n.

The road through enclosed fields and gardens for ½ mile, then passes between the small villages of Masdeh and Sirmasdeh, and enters upon an extensive plain highly cultivated. 4 miles, road passes a water-mill, and is crossed by a stream of water coming from right: beyond this cultivation ceases. Lying to the left of road, and distant from it about ½ mile, small village of Aghoor. 6½ miles, another water-mill and stream crosses road. 7 miles, river Sheeztraz crosses road; this rises in the Koh-e-sureh, with broad stony bed; water about 2 feet deep. On the left, about a mile from road, village of Kundoor, with gardens and cultivation. This village, with six others in this valley, and seventeen in the valley lying to the n. of the Koh-e-sureh, have been lately given by the Persian Government to Attiaoolah-Khan Timooroo: this man was formerly a resident in Herat: during the late siege he fled from the town and delivered himself up to the Persians. On these villages being given to him, he induced some 2000 of his tribe to leave the Herat valley and establish themselves here: the black tents of the Timooroes are to be seen scattered about this valley. 11 miles, Shefseebad, passing a small village on the left: considerable extent of ground around Shefseebad under cultivation: contains some 30 or 40 dwellings. To the right, under the hills, two villages are to be seen, distant some 4 or 5 miles; to the s.e. a range of mountains running e. and w., now completely covered with snow. 14½ miles, pass on right village of Kuddookun, and pass through Badruskun, beyond inhabited part of which is small fort, with well and ditch: immediately to left of road, 17 miles, Ibrahimabad; small village; extensive ruins around. 19½ miles, Rab-col-bukm: near this some gardens and stream of water cross the road. Anarbat contains some 150 dwellings. The first part of to-day's march over alluvial soil; the latter soil of gravel and stony; bearing, w.n.w.

Anarbat to Cheshmah-Shah-Hassan, 24½ m., 11 c. n.

For 2 miles by gradual ascent to lower spurs of the Koh-e-sea; cross some low hills incrustated with salt. The road, after passing through these hills, and over some ravines with steep banks, lies across a plain covered with bush and shrub; a small fort visible to left, whether inhabited or not uncertain;

* These run parallel to the road, and are distant from it two or three miles.

gradual ascent to distance of 8 miles, thence descent; and $8\frac{1}{2}$, a warm stream, slightly brackish, crosses the road: just below this, sandy bed of river, containing a small stream of brackish undrinkable water: the road crosses this and passes along the base of a scarped rocky mountain that here rises to the left abruptly from bank of river; this range continues, recedes from road, and further on assumes larger dimensions, running s.w. and s.e. $11\frac{1}{2}$, a small patch of cultivation and two or three hovels by side of road called Hassanabad: hence the road continues over a hilly broken plain incrustated with salt, and on which no habitation of man is anywhere seen: to the right, a long distance off, are seen a portion of the Elburz; this side is the fertile valley of Kamiseh. $22\frac{1}{2}$ miles, a small brackish stream called Jamool-Mook: caravans sometimes stop here. $24\frac{1}{2}$ miles, another brackish, though drinkable stream; encampment to right of road, 1 mile distant, at a spot called Cheshmah-Shah-Hassan. The ascent in to-day's march considerable, though gradual—I should say some 800 feet higher than last night's stage; no village here or habitation of man.

Cheshmah-Shah-Hassan to Tourcon, 31 m.

The road, over broken hilly plain, similar to that of yesterday. At distance of 7 miles a large pool of rain-water: around this some Timourees had pitched their tents; they belonged to the nomads of the Herat territory. 16 miles, about a mile to left of road, at the foot of some white chalky-looking hills, a well of brackish water. At rather less than 16 miles road enters low stony hills, and continues for about $2\frac{1}{2}$ miles winding through them, then enters a desert hilly plain similar to the one passed through this morning. 26 miles, a line of cannats, containing a little water, crosses the road. On the left is a large rocky mountain, Koo-e-tourcon, at the base of which a few small villages are seen. Gradual ascent to Tourcon: small village; provisions scarce; a fort on left, on a mamelon, overlooks village and gardens. Road throughout to-day's march over firm gravel soil, bearing s.w. ($8\frac{1}{2}$ hours in the saddle).

"The morning was so bitterly cold that we were all obliged to dismount and lead our horses."—(*Journal, March*).

Tourcon to Zaughuda, $24\frac{1}{2}$ m., 11 c. n.

$2\frac{1}{2}$ miles across plain to small village of Chaumnabad, or Zaboonsbad: has a little cultivation and small stream of water.* On the left, distant some 4 or 5 miles, base of large bluff mountain of Tourcon, about which a few small villages are seen; the plain beyond the village traversed in all directions by sand-hills and ridges. At 6 miles road passes between high rocky hills; and at 10 miles pool of good water, on the right, from a ruined cannat; on left ruined walls of fort. $13\frac{1}{2}$ miles, road, crossing low gravelly hills and ridges, arrives at Beezamah: a stream of good water; trees on left; on right, a little further on, ruined fort; a little cultivation, with a few inhabited dwellings; the road for remainder of march through barren plain. Passing ruined walls of Magna, gradual ascent to rocky hills, passing through a portion of which arrives at Zaughuda: a well of water to left of road; a broad track to and from it; water slightly brackish; firewood abundant; encamping-ground confined.

Zaughuda to Khanahoodce, 30 m., $13\frac{1}{2}$ c. n.

Road bearing w. across some hills entered yesterday: from these gradual descent to uneven rugged plain. 8 miles, cross the Kaul-murra; water very brackish: same river that flows by Pool Abreshun; here but little water; said to go to Yesh. 12 miles, covered well with good water; also called

* A high mountain covered with snow, one of the Elburz range, on the right, was called Towein.

Haus-Kaul-Murra. 17½ miles, another well; water good. Chah-Koosh; from this across extensive plain thinly covered with bush and shrub; to the right, on the plain for some 2 or 3 miles, vegetation was visible; beyond it had the appearance of a desert sandy waste. 23½ miles, road enters hills, after gradual ascent, and passes small well on left. 24 miles, through hills; leaving these, road bears s. for a short distance, passing the village of Gerdan on left. Beyond this village is another, *Ghirat*, under rocky hills; these run nearly s. and s.; the rest of way across stony plain. Khanahoodoo, village of some 200 dwellings, with a little cultivation; water good.

From Khanahoodoo a road joins the Teheran and Meshed road at Abbasabad. From Khanahoodoo to Dusigird is 3 fursungs; from the latter place to Abbasabad is 6—these last 6 fursungs through a perfectly desert country void of water.

Khanahoodoo to Bearjoon, 8 m., 4 c. n.

Road bearing s.w.w. across open, barren plain; for the first part stony, latterly fine gravel; but little vegetation, except camel-thorn, visible. The Mayo-meed hills are seen to the s.w. Bearjenund, a small village with gardens, and some extent of cultivation around.

The country between Ghorian and Bearjoon presents throughout the self-same never-varying features—barren, desolate plains broken by ranges of bare hills and mountains. No trees, except in the immediate vicinity of the villages, are anywhere seen. The vegetation, thinly scattered, consists of a dwarfed, resinous shrub and the camel-thorn. The soil for the greater part is fine gravel mixed with sand; but little granite and less quartz meets the eye; the more common formation of the rocky hills is of conglomerate stone. Marble is seen in large masses (a blue dark-coloured stone, sometimes also of a reddish hue streaked with quartz); there is also a great deal of a dark-coloured rock, in which copper is found, but in small quantities, and the mines which are said to exist are not worked.

Bearjoon to Goud-e-bang, 22 m., 13 c. n.

Road, leaving gardens of village, turns abruptly to left for a few hundred yards, then bears w. across an open plain, gradually ascending towards high rocky hills—one on the right called Koh-e-shutr, the other on left Koh-e-soekta (a continuation of those near Mayo-meed, which were visible). 9 miles, road enters hills, and passes Keekee, a ruined fort, with a well of good water. Hence, ascending and winding between hills thinly covered with bush, pass, at distance of 12½ miles, a spring of good water; very small, and not enough to form a stream: beyond this, road by steep ascent to the highest point passed in these hills (13 miles highest point): this, I should say, is the highest point on the road between Herat and Shahrood; snow was visible on northern side of a hill close to the road, and vegetation was later here than in any place yet passed. From this gradual descent through hills, and then across barren plain to Goud-e-bang: deserted village; ruined walls, and well of water: no supplies: said to have been deserted a short time ago, the inhabitants fearing the Turcomans, who were reported to be at Mayo-meed.

*Goud-e-bang to Shahrood, 26 m.**

Road crossing open plain; at 5 miles enters hills. At about 6 miles, winding round base of high and rocky conical hill, passes a small spring of water, called Goolley-a-haranau, on the right; road beyond this stony, ascending and descending between bare hills. 13 miles, a well of water to the right, on bank of dry bed of mountain torrent, the course of which road follows for

* From Teheran to Herat, by this route, is called by the natives 180 fursuks; *via* Meshed, 207 fursuks.

some distance. 13½ miles, road leaves hills, and, gradually descending, bearing s.w., crosses, by a wooden bridge, a small stream (the banks of this much incrustated with salt, though water is fair), about ¼ mile from village of Dehseeh, surrounded by extensive orchards and vineyards: the road makes a great bend to left to pass through this village. 3½ miles from this crossing valley in northerly direction to Shahrood. From Shahrood to Teheran, about 9 days' march, we pursued the same route by which we had gone in August.

The distance from Herat to Shahrood, *viâ* Khaiff and Toorsheez, is 414½ miles; the greater part of the road is good, though here and there stony amongst the hills, several low ranges of which are crossed. In winter, for laden camels, this route is preferable to any other: it is the shortest, and, the soil being of light gravel and firm throughout, the road keeps good notwithstanding heavy rain. During summer this would be a cruel route for any laden animal. Some of the stages are long; forage is procurable only at the large villages, which are sometimes 50 and 60 miles distant from each other. Water is scarce even at this time of the year (March), and is in many of the wells brackish and bad. Camels are the only baggage-animals that can travel this route without the owners incurring heavy loss. Mules seldom or never are permitted by their owners to travel this road owing to the reasons above stated. There is not much traffic on this road at any time of the year. We met only one caravan throughout our journey! In the plains of Khauff and Toorsheez corn sufficient only for the consumption of the villages in those districts is grown; none is exported. The only exports spoken of by the natives are a sort of plum and grapes, both of which are sent in the shape of preserved fruits to the capital, where they find a good market. Cotton, though in small quantities, is also exported; which finds its way to Astrabad, where it is purchased by the Russian merchants. The imports to these districts consist of rice grown in the Mazanderan province, which here has a ready market; for, owing to the great scarcity of water, no rice can be grown in the country. European cloths—printed calicos and such goods—are sent here from Teheran. None of the caravans from the K. (Herat, Caubool, Candahar) take this road; they keep to the upper, *viâ* Meshed and Subzewar.

3. Route from Tehrân to Bushire, *viâ* Ispahan and Shirâz.

This road after leaving the valley of Shirâz descends upon Bushire from the high table-lands by a series of difficult precipitous mountain passes.

*Tehrân to Kinaragird, 5½ H. B., 20½ M.**

April 18th.—Left by Shah Abdool Azem gate, and passed through small suburb of town (from this the road to Meshed is on the left); the level plain beyond covered with walled gardens and villages. Several lines of cannauts and small streams cross the road, current from right to left. Some 2 miles to left of road is passed the Shah Abdool shrine, at the foot of rocky spur of Elburz, amid the ancient ruins of Rhages. At 7 miles, ruins of village and garden, close to left of road; 9½ miles, slight descent to small cluster of villages called Kareezuk, with gardens and cultivation. This plain is cut up by several deep ravines; soil alluvial; from Kareezuk by large beaten track bearing s. 11½ miles, cross small stone bridge; a short distance beyond this a ruined enclosure to right of road. 13 miles, road passes over a ridge of low gravelly hills. From this the ascent is gradual for a mile and a half, when the road enters a

* A village with about 30 or 35 houses. Water good—provisions moderate.

range of rocky hills; road good, and, ascending for 2 miles through hills, the highest point is reached: descent $1\frac{1}{2}$ mile through hills. The road then, across open plain, gradually descending to Kinaragird, on right bank of Kerritch river, which the road crosses by ford just before arriving at post-house.

Kinaragird to Hous-Sultan, $5\frac{1}{2}$ n. n., 21 m.

Half a mile by bad road, cut up by water, to Zecan, a small village of about a dozen houses. Beyond this road crosses marshy bed of river, by causeway and bridge. From this road, bearing a little w. of s., strikes across undulating desert plain, for the first part alluvial, latterly gravel and stones. 5 miles, a large stream coming from right is crossed. Immediately beyond this, short though steep ascent to small table-land. Country broken by small ridges and hills, many of which road lies over. 11 miles, ruined serai, with muddy pool of water. From this, by excellent road, cross desert to Hous-Sultan. Post-house; serai newly built; attached to latter a few houses. Before reaching Hous-Sultan, about a mile to the right, is an uninhabited fort. To the left, distant some 5 miles from road, a large salt-lake is seen. Brackish water from covered well; provisions scarce.

Hous-Sultan to Pool-e-dulak, $4\frac{1}{2}$ n. n., 18 m.

By good road leading s. across desert track of country, on which not a vestige of vegetation is visible. 12 miles, a caravanserai, in good repair, with covered well of water.

Sudrabad.—From this the road gradually ascends, and, at rather more than 2 miles from Sudrabad, enters low rocky hills. 16 miles, road, having passed above range of hills, descends upon Pool-e-dulak, a caravanserai and post-house, on left bank of Sawa river, which is here crossed by good brick bridge. Water at this time of year in considerable volume, though brackish and muddy; in summer quite dry. Supplies are brought here for caravans from Kûm.

Pool-e-dulak to Kûm, $3\frac{1}{2}$ n. n., 14 m.

Cross the Gonsir river by brick bridge, thence some 7 miles across barren desert plain, on which but little vegetation is visible. 7 miles, cultivation on left of road, extending to small village, distant about a mile from road. To the right, also, a small hamlet off the road; enter and pass through low bare hillocks and broken ground, with gradual ascent to left bank of Kûm river. Cultivation extends some distance to the right; post-house and serai on bank of river, opposite a brick bridge. Supplies of corn and provisions here abundant.

Kûm to Pasengan, $3\frac{3}{4}$ n. n., $14\frac{1}{2}$ m.

The road leaving post-house crosses the Kûm river by good bridge, and enters the town, through the bazaars of which it continues for rather more than a mile. From the town, road bears in a south-easterly direction across a highly cultivated alluvial plain on the right; distant some 3 miles is a range of sterile hills, with rocky peaks; behind these, again, is a high range of mountains, with snow on the summits (April). Cultivation extends some 7 or 8 miles along the base of above hills. $8\frac{1}{4}$ miles on left, small village of Khorabad; ruins and cultivation around. From this across barren plain, passing, at a distance of 12 miles, ruined walls of village Pasengan, with post-house and serai.

Pasengan to Sin-Sin, $5\frac{1}{2}$ n. n., 21 m.

For about 6 miles across stony plain, bearing s.e. Here the road passes along the base of a rocky perpendicular-sided hill on the right. On the left a few detached hills break the surface of the plain. At 10 miles (the rocky

range to the right approaching nearer the road), cross the broad bed of a mountain-stream, in which there was a little water. On the right bank of this stream, immediately on the right of road, is the small village and serai of Shoorab, with a stream of clear sweet water on left. From this, road bears s., crossing a hilly broken country (a spur from the range which has been parallel to road since leaving Kûm). 14 miles, the small village of Bag-e-Shah. 16 miles, road leaves the hills, which here terminate in the plain; a mile or so to left, and passing some cultivation and ruins (Deh-Aunar), descends across stony plain to Sin-Sin, a small village with post-house and serai; good water. Demnavend bears from here N.E. Teheran, 3 or 4 points E. of N.

Sin-Sin to Kashan, 4½ N. N., 20 M.

The road bears slightly E. of S. across a plain entirely devoid of vegetation. 7 miles, pass the small village of Kasimabad. 10 miles, Nusserabad, with good caravanserai on left of road. 13 miles, the village of Alyabad on left; on right, ruins amid cultivation. Running parallel to road, some 3 or 4 miles to the right, is the same range as yesterday. Along the base are several small villages; the plain covered in all directions with cannabits. Enter Kashan by road rudely paved with stones; a considerable town, celebrated for its silk manufactures.

Kashan to Kohrood, 6½ N. N., 22 M.

For rather more than a mile the road keeps along the ditch which surrounds the town. Debouching into the plain, through cultivation, it passes some two or three enclosed gardens to the left; beyond these the plain is stony and barren, and, for the most part, undulating. At distance of 5½ miles pass a ruined village, and cross a stream coming from mountains on right. At 8 miles another stream is crossed. 12 miles, the road, which so far has borne S., bears away to the S.W., and ascends towards the mountains. 14½ miles, the caravanserai of Gueberabad. From this road descends to banks of mountain torrent, whose course it follows, crossing it several times; the road is stony and bad, with constant ascent. 18½ miles, the road by steep stony ascent along the face of scarped hill; the gorge is in many places confined; overhung by rocky bare precipices. 18½ miles, the bund (a large dam, built by Shah Abbas) confining the waters of stream is reached. On the left, a tank, about a quarter of a mile long, of clear water. Beyond this the gorge widens, cultivation commences, the road winding between gardens and orchards till it reaches village of Kohrood. Contains some 300 houses, built one above the other on side of stony bare hill.

The heights on either side of this pass are rocky and precipitous, and could not be crowned without heavy loss if held by an enemy. They approach in many places to within 200 and 300 yards of each other. The village and gardens of Kohrood would in themselves be a strong position to force. The village, built on slope of rocky hill, completely commands the road towards Isfahan.

Kohrood to Beedushk, 5½ N. N., 24½ M.

By winding road, with continual ascent. At a distance of 5 miles the gorge, turning E., is abruptly closed. The road crosses the ridge by very steep ascent, occupying less than a quarter of an hour. Snow lay in the clefts of ridge (April 27th). From this continued descent for about 8 miles, passing on right, at distance of about 10 miles, the village of Merawund, apparently ruined, occupied now by a few families of *Eliants* (nomads). The mountains here are rocky and barren; only in the hollows, along the banks of small streams and melted snows, is verdure to be seen. Before descending into small valley of Soo many ridges and undulations are crossed. Soo distant 20 miles. Two small villages on right, with considerable cultivation around. Water

abundant. 4½ from Soc, road, passing large enclosed garden on left, arrives at Beedushk, a small village, with some 30 houses and cultivation; post-house. This village lies half a mile to left of road.

Beedushk to Moorchekear, 4½ n. n., 20½ m.

Leaving village and descending by bad road, at distance of more than a mile fall into the large caravan-road on right. At distance of 2 miles pass on right small village of Dah-loor. From this by excellent road, with gradual descents, across extensive plain, thinly covered with bush. At distance of 10 miles pass on right ruined serai (Adumabad) and deserted post-house. Approaching Moorchekear, a cannaut stream from right is crossed, and mud-built ruins surrounded by cultivation are passed. The plain is bounded to the s. by high chain of mountains running e. and w.

Moorchekear to Ispahan, 6 n. n., 30 m.

By good road across open plain. At 5½ miles pass the caravanserai of Madar-Shah, a very fine building, now falling to ruin. Beyond this, road, with slight ascent, passes between some low hills. At 10 miles, deserted guard-house. 11 miles, the ruined serai of Aganeer: the high rocky range that bounds the plain on the e. are distant from the road and parallel to it some 5 miles. To the left one or two villages are seen, and one on right under hills. 21 miles, the caravanserai of Gez, an extensive building. The road for about 17 miles is over a light gravel soil, and very firm. Hence to Ispahan, soil alluvial, slightly encrusted with salt. From Guz to Ispahan through cultivated plains. Road crossed by numerous streams of water. The mountains on the right recede, and, forming a basin, sweep round, and then, taking an easterly direction, confine the town on southern side. Distance by our route from Tehrân to Ispahan 226 miles.

*Ispahan (viâ Julfa) to Mayar, 5½ n. n., 25 m.**

Cross the Zenderood by Ali-Werdi-Khan bridge, and, passing through a few fields of cultivation, enter the suburb of Julfa, situated about 2 miles s.w. of town, and extending along some 2 miles distant from base of rocky precipitous mountains.

Leaving Julfa, and passing through several ruined gardens and walls, the road ascends gradually towards a break in the mountains; at a distance of 3½ miles the highest ridge passed; hence, winding among low bare hills for about a mile, descends gradually, and good road to Margh in the plain: a ruined serai, with well and tank of water. Soil about here of clay, and encrusted here and there with salt. To this from Ispahan there is a more direct road, crossing the Klmjoo-bridge, and leaving Julfa on the right: this is the post-road—the best and shortest, about 9 miles direct to Margh. Serai distant from Julfa 9 miles; a few supplies obtainable. From serai road bears s.e. across light gravel soil, and at 14 miles enters hills; the mountains on both sides rocky and precipitous, lying a little off the road: a short, though very difficult, ascent is passed. Road lies across and over a mass of rock, in which rude steps are cut. Beyond this road good, passing on left a covered well with water. 16 miles, road leaves hills and descends into extensive level plain. To the right rear, distant some 6 or 7 miles, a portion of the fertile valley of Singoon is seen; on left, receding from road, the precipitous rocky chain continues. 19 miles, ruined serai. 23 miles, situated at foot of hills on left, ruined village (by some called ruins of Mayar); the road, slightly ascending, passes round foot of hills on left, and descends to Mayar. A little cultivation around.

* Distance and time taken from outer gate of Julfa.—Julfa, the Armenian suburb of Ispahan.

Mayar to Koomeshah, 3½ n. n., 18 m.

Passing through the extensive ruins of Mayar, road crosses a level uncultivated plain, bounded on all sides by rugged mountains. 7½ miles, a small guard-house (unoccupied), and a little beyond it enclosed garden and Insaumzadeh of Shah Sidda-Ali, with fine stream of water. 3 miles further on, cultivation extending to village of Ispay, situated about 2 miles to left of road; beyond which, again, is the village of Munshoorabad. The road here slightly ascends, following along base of rocky chain of mountains on right. 18 miles, a small round tower on right of road. Road, bearing a little w. of s., approaches the entrance to the valley of Koomeshah. This entrance some 3 miles broad; at either end precipitous rocky mountains rise abruptly. The road, passing through cultivation, enters village of Shah-Reza; on right a fine enclosed garden, in which is the Insaumzadeh of the same name. About 2 miles from this Koomeshah, amid cultivation, a walled town, containing some 600 houses. Road throughout march good to Shah-Reza. Soil of gravel; from that village alluvial. Supplies of all kinds abundant.

Koomeshah to Aminabad, 3¼ n. n., 26 m.

For a few hundred yards road bears n. towards rocky mountains (these end abruptly about a mile to the n. of village), and, crossing a deep ravine by brick bridge, keeps along the banks for a short distance; thence along base of mountains on left bearing s. These bound the valley on the eastern side; further on recede some 2 or 3 miles from road. 5 miles, ruined walls by side of road. 8 miles, garden, with stream of water. 13 miles, the village of Ooshaira (or Kooshaira), half a mile to right of road: here is the post-house. Rather less than 15 miles, road passes through the Maksood Begi, with ruined serai. Provisions here said to be scarce. From this village, road lies across a level gravelly plain, covered with small bush and tufts of grass; to the right several villages are seen scattered over the plain, and along base of mountains that bound plain on western side: the largest of the latter, seen from Maksood Heggi, is Isparjoon. This plain of Koomeshah must be upwards of 50 miles long, and an average breadth of 16. It contains some 40 mud-walled villages, around which, for a short distance, cultivation extends.

Aminabad to Shulgistan, 6½ n. n., 32 m.

Road bearing s. across plain similar to that of yesterday. About 4 miles a deserted guard-house is passed. A little short of this a road turns off to the left. This is the shortest road to Shulgistan, and shorter than the one we came by by some 7 or 8 miles (we missed the road in the dark). 9 miles, road passes round the base of conical-shaped hill, detached by a short space from the chain that bounds the valley on the western side. 11 miles, village of Yezdi-Kast. The village, built on a large mass of rock rebutting into valley, is lofty and of singular construction (similar to that of Lasgid); contains some 300 houses. Road winds round base bearing n., and, descending into the small valley† of Yezdi-Kast river, passes post-house, crosses river by brick bridge, near which is a carvanserai, and, keeping for a few hundred yards along right bank, ascends, by steep rocky‡ bit of road, to the level of plain same as before. The valley or plain here contracts, having an average breadth of about 10 to 12 miles. No villages or cultivation to be seen till

* 3 hours 5 min.

† This valley, or large ravine, which is highly cultivated, has a breadth of from ¼ to ½ of a mile; its sides are perpendicular, the level of the valley being some 60 to 80 feet below that of plain.

‡ Distance 12½ miles.

approaching Shulgistan, small village of 60 houses. Water from cannaats. This river is called also Malwun, Malyoon river: it rises some 4 farsuks from the village, and is lost in the plain.

Shulgistan to Abadeh, 4 n. n., 21 m.

By good road bearing a little n. of s. across plain similar to that of yesterday. It has here a breadth of from 10 to 12 miles. To the s.w. a high rocky range, with snow on the summits (by some called Kooh-Bool); distant some 20 or 30 miles from road. At distance of 11 miles to right of road, under hills, the village of Cheekoo; approaching Abadeh, distant 4 miles, cross stream of water, and pass ruined walls; hence, through cultivation, to Abadeh; walled village; no serai or post-house. Water good from cannaats. Provisions abundant.

Abadeh to Soornia, 3 n. n., 14 m.

By good road through same plain as yesterday, which here presents a highly cultivated appearance. 2 miles, small walled village, amid gardens; on left several enclosed gardens are seen scattered over surface of plain. 6 miles, through ruins, and pass a small hamlet. 8 miles to the right, under hills, large village of Chenar. At foot of the mountains the rocky snowy range seen yesterday to the s.w., distant from road * 8 to 10 miles, here bounds the plain to the w. It sweeps round a few miles beyond Soornia to the n., so closing the plain of Koormeshah to the s., and joining those that bound it on the w. General bearing of road a few points n. of s. Soornia village, with extensive cultivation. On approaching, a very ancient ruin is passed on left (by some said to be a fire-temple; others, one of seven that were built by Beiram Goor).

Soornia to Khan-Khoora, 4½ n. n., 23 m.

Gradual ascent after leaving valley, road bearing s. across same plain as yesterday. About 5 miles, the mountains on the right and left close in on the road. The valley here contracts, and has a breadth of about 2 miles. Rocky detached hills are passed on both sides. The road, still keeping very good and broad, follows along base of rugged mountain on left. A small village at the base of mountains on right is seen. 16 miles, the mountains on both sides recede, and the valley widens into an undulating plain of some 12 miles in breadth, covered with small bush and shrub; one or two dry beds of streams are crossed. No water seen or passed in to-day's march. Khan-Khoora post-house and serai. Small spring of water. No provisions procurable. On the mountains to the right snow was visible at a height of some 400 feet above level of plain (May 9th).

Khan-Khoora to Deh-beed, 3½ n. n., 18 m.

Across undulating plain same as yesterday for about 4 miles, with gradual ascent, and by good road over stony soil. Here, entering low rounded hills, covered with small shrub, the road winds, with gradual ascent, along banks of small stream. At 7 miles ascend to top of highest ridge; in a hollow close to road snow was visible (May 10th). Hence, the country assumes the appearance of a much undulating plain (to the right rear a conical rocky peak, distant some 5 miles, is seen), gradually descending over which road arrives at Deh-beed—a ruined serai and post-house amid cultivation. These lands are cultivated by people from small villages distant some 2 or 3 miles. Ruins of an ancient fire-temple. Moderate supply of water from small streams. Vegetation very backward. About 12 miles in a westerly direction the people speak of a small lake near the villages of Ruffar and Nazimabad.

* Gekleed and Keeleed are two villages that lie to the right of road, hidden behind a spur from this range.

To-day's march would in itself present no difficulties to troops marching; but, supposing the country to be in the hands of an enemy, the low hills spoken of would require to be cleared before the advance of the main body, for in many places they completely command the road. Water and provisions are scarce. For our small party we were obliged to carry 2 days' provisions from Soornia.

Deh-beed to Moorghaub, 5½ h. n., 26 m.

At Deh-beed the post-house is 200 or 300 yards to right of road. A foot-path from it, through cultivation, leads around base of an ancient fire-temple to main road. Hence, gradually ascending and bearing s., passes between low hills. 3¼ miles descent across hilly country. 5½ descending to level of much undulating stony plain strikes s. across it. In one or two hollows are small streams of water and a little cultivation, belonging to Eliants, a few of whose tents are seen. 14 miles, a ruined serai on left bank of small river (current from right to left, and said to come from Khan-Khoorn). To the left of serai small valley, extensively cultivated; ford easy, with low sloping banks. Hence road, at 15½ miles, turns into a gorge of the mountains, and, by steep stony ascent, arrives at a comparatively open space, and crosses dry bed of mountain torrent, keeping along right bank of which makes another steep ascent (the road here has been cleared, and is very fair) across a high ridge, the top of which is about 19 miles. Hence descent, and cross small valley, with dry bed of stream on left. Another steep and very rocky ascent (21 miles). Gradual descent commences by stony road, winding under high rocky mountains thinly covered with small trees and bush. Of two roads the left is taken (the right goes to Killa-nou), and about a mile beyond this a fine spring of water on left of road, which forms below a small pond: it runs on a considerable stream, and waters village of Kadirabad, visible to left. Road crosses stream, and descends to Moorghaub. 80 houses. Provisions scarce.

From Deh-beed to foot of mountains is 3 hours. Road easy, though in places somewhat stony. 2½ hours through the mountains, during which there are three steep ascents; road very difficult, on account of large masses of rock and stone that lie upon it. The mountains on right and left command the road to within 2 or 3 miles of Moorghaub: water abundant in the mountains. This would be a difficult and arduous march to an army at all times. Were the mountains and commanding points in the hands of an active enemy, considerable opposition would have to be met, besides the natural difficulties of the road: some hours' labour would make the road quite practicable for guns.

Moorghaub to Sivend,† 7 h. n., 32 m.

By bad road, through irrigated lands, bearing s.w., then over undulating hilly country. At 8 miles strike into large road (left yesterday to the right), here bearing due s. and s. 5 miles, Eliant village, in small plain of Deh-nou. The Eliants are nomad tribes. Road winds round base of wooded hill, and passes through the plain, which has remains of ancient ruins. At 8 miles, arrive small deserted village of Mader-i-Soleiman (Cyrus' tomb). 8½ miles, road, crossing small stream from right and bearing nearly w., enters gorge of mountains; immediately on left is the River Poolwar. Road keeps on right bank; ancient roadway cut along the face of a precipice; passes inaccessible; rocky heights are on both sides of road. 11 miles, gorge opens, and road keeps along an alluvial small valley, in which wood is thinly scattered, as also in bed of river; mountains recede, and road crosses a small plain, some 5 or 6 miles long, that has the appearance of having once been a lake. River and

* Three hours to foot of mountains, 2½ through mountains.

† Encampment on left bank of river at watermill below Sewund, and a mile beyond it.

road both find an exit from it by bearing s. and again entering mountains. 19 miles, road debouches into a broad valley (running nearly s. and w.), and passes on left two or three small villages; road bears w., and 24 miles passes s. of Kuranabad amid vineyards and cultivation. Mountains on right sweep round, and road, bearing s.w. 27 miles, crosses to left bank of Poolwar; road stony and undulating. 31 miles s. of Sivend, on left, on side of mountain, valley of Poolwar, well cultivated.

Sivend to Kinara (via Nakshi Rústum and Ruins of Persepolis), 20 m.

By good road along valley bearing s.e.; cultivation along valley. Mountains on both sides, rocky and inaccessible. About 4 miles the village of Seidoon is seen on left (the post-road continues, and, passing through Seidoon, arrives at Kinara—distance called 5 farsangs). Leave road by small path on right, cross river, wind round base of rocky mountain, and then bearing w. and parallel with rocky range on right; on left, a highly cultivated valley. Arrive 12 miles at Nakshi Rustum; hence across valley, much cut up by canals and watercourses, bearing s. to Persepolis (ruins), distant some 5 miles (including great twistings of road). Persepolis to Kinara, across alluvial cultivated plain, distant 3 miles. Village of 200 houses. Water and provisions obtainable. E.N.E. two mountains with scarped rocky summits, Istakar and Shahruc, are seen.

Kinara to Zirgún, 3 H. R., 15 m.

By small path bearing s. of w. across cultivation. At distance of one mile strike into large road, and cross watercourse by small wood bridge; road bears now s.w. To the right rear, distant some 8 or 9 miles, are the mountains Astakar and Shahruc, three separate mountains, with singularly scarped summits. They bear a little w. of s. from road: at their foot is seen the village of Futtawa. At the foot of Shahruc is small village of same name not visible. The whole of this Murdusht plain is alluvial. 7 miles, a brick bridge, with two lofty arches, is passed: this will soon be in ruin unless repairs are undertaken. The river is here some 30 yards wide, with rapid current: the people call it here Poolwar. The junction of the Poolwar and Bendamir (the latter coming from the s.w.) takes place some few miles above bridge. Arrived at the right bank, the road turns abruptly round base of rocky hill, which here completely commands both banks of river. Hence, the road crosses a perfectly level alluvial plain: in dry weather, road good; in wet, would be impassable, owing to peculiar nature of soil. 12 miles, plain on both sides is marshy, and a rude stone causeway continues, with some two or three breaks, for about a mile across it. Road shortly after this winds round base of rocky hill, and, bearing s. along base of it, arrives at Zirgún, with cultivation. Good water and provisions.

Zirgún to Shiraz, 4½ H. R., 16½ m.

Road for 3 miles bearing s.w. across valley, then ascending and entering upon a hilly country, over which the road is bad, being covered with loose round stones. Pass at distance of 6½ miles a ruin; on left from this a steep stony ascent commences, the summit of ridge being reached at distance of about 8 miles; half a mile descent, and then cross a small smooth valley (in which many Eliant tents were visible), about a mile broad. 9½ miles, ruined serai of Badjegah, with stream of water, and little cultivation. Immediately beyond this another steep ascent across ridge. Road, winding a good deal, though with a general bearing of s., passes some old ruins and stream of water at 14 miles. About 2 miles beyond this, road turns abruptly w., and enters narrow rocky gorge (of Allah-Hu-Ackbar); road cut in the rock of the right side of defile; immediately below is Shiraz. At the foot of the gorge a large gateway is passed under.

The greater part of to-day's march is by an execrable road, covered with loose round rocks and stones. Two of the ascents and descents are, on this account, severe: to make the road passable for guns labour would be required. Just before reaching Shiraz defile much confined. The heights, in the hands of a resolute foe, would hold the pass against an army coming either way.

Shiraz to Khan-i-Zenian, 6 n. n., 26 m.

Leaving the town by the Bag-e-Shah gate, road bears w. through a highly cultivated country. Road bad, being covered with loose stones, and crossed every now and then by small streams: long lines of gardens are seen to the right at base of mountains about a mile from road. 4 miles is the village of Koshan (100 houses). The extensive gardens of Mesjid Verdah, some 400 in number, cover surface of plain to right, which here has a breadth of about 4 miles; a high scarp mountain on left, called Moollah Sirdeh. From Koshan, road ascends gradually, across stony plain, to Kinaradgah, a ruined serai, 8 miles from Shiraz. Here the mountains on either side close in, and road, crossing a mountain torrent by brick bridge, enters a hilly broken country. Constant ascent for about 2 hours: road stony and bad. The hills on both sides command the road in several places: they are well covered with bush and shrub. About 4 miles from Khan-i-Zenian, road approaches left bank of Kharabauteh river, with broad jungly bed and fine stream of water, with many ascents and descents over a very broken country. The road, keeping along or near bank of river, arrives at Khan-i-Zenian, a ruined serai and small village of about a dozen houses, on the banks of a stream, a tributary of Kharabauteh. Provisions scarce.

Khan-i-Zenian to Mean-e-Kotul, 6½ n. n., 23 m.

Road bears w. for 2 miles across plain of Zenian and then enters hills. 3½ miles, cross to right bank of Kharabauteh river (fordable at all points at this season). For 1½ mile road keeps along bank; and in bed of river, on both sides of road, is thick jungle. Close on the left are low wooded hills. 6 miles, a ruined guard-house is passed. So far road is good, though in places stony. Here commences a very steep ascent, called the Seena Suffeed, which occupies rather more than a quarter of an hour. Road is broad, but covered with loose stones and shingle. Near the summit are some bad places; road leading over rocky masses. 7½ miles, another ruined guard-house. Rather less than 8 miles, small round tower on left marks the commencement of descent. This is a commanding spot, owing to height; but jungle is thick around it: 1½ mile gradual descent to a small open space. To the left, receding from road, is a singular scarp mountain; on the right are low hills. From this another short descent, and enter plain of Dust Arjun, for about a mile in a north-westerly direction across it. 12 miles, village of Dust Arjun, nearly all in ruins, under foot of mountain. A short distance beyond, from the base of a precipitous cliff, gush forth several springs of water (Shah-Sooltan), which, forming a considerable stream, flow across plain, and cause, some 2 or 3 miles distant, a marshy lake.

Mean-e-Kotul to Kazerun, 5½ n. n., 21 m.

Descent, by similar road to yesterday, continues for three-quarters of an hour. About 3 miles, road, bearing n.w., enters a small valley (Dusht-bear); trees here are fine, standing some distance apart, and with no undergrowth; for 5 miles along valley, greater part of which road is good, but over alluvial soil. About 7 miles, cultivation is seen on both sides of road, and continues for a mile. 8 miles, road, turning w. into narrow valley, passes covered well; for half a mile, with short descent, passing one or two houses. Just beyond these descent of the Kotul-e-douhter commences. The descent is rapid—I

should say 1 in 8 or 10; but the road is excellent. The road leads down the precipitous sides of a lofty mountain: the roadway, for the most part, is perfectly smooth, quicklime having been used in filling up and levelling the way after the stones had been laid down. A strong stone parapet, also finished with brick and lime, is continued for about 2 miles, the length of this roadway on left. So perpendicular is the mountain that a stone might be thrown from the summit on to any part of this way (this repair was effected in 1857). Continued descent (altogether from summit occupying about one hour) to base of scarped mountain on right, at foot of which is small building. 12 miles, here road enters plain of Kazerun, and, crossing a marshy stream by stone causeway and bridge, passes through an undulating cultivated plain. This stream, flowing to the left, forms a good-sized lake, called the Durrea Pereshoon, about 3 miles from road. Some said water was good, others affirmed it to be salt; it had the appearance of fresh water. I could see no villages on its banks, nor cultivation. Rather more than 16 miles, square tower on left is passed, and a good stream of water from right crosses the road. Considerable cultivation around. Harvest here now just commencing.

The lake near the Nukhs-e-Timoor is called the Durrea Pereshoon; the water is brackish but drinkable.

It appears to me that the road, instead of scaling the highest and most precipitous mountain of the range, might have avoided, by going a little more to the s., the pass of the Kotul-e-Dokter.

Kazerun contains some 4000 inhabitants, of whom some 30 families are Jews. The governor is Mirza Mahmood Kazeronee. Provisions are abundant. Fine pastures in the valley. Town built of stone. Water-supplies principally from cannauts.

A road from Kazerun to Dnsht Arjun, avoiding the Kotul Douhter and Pierzun, leaves plain by Tungu-Turkan pass, and, striking s.w., passes village of Nadoon half-way. This road called 12 fursaks; the one by the pass 8.

Kazerun to Kumaridge, 5½ n. n., 19 m.

The plain around Kazerun is cultivated for some miles. Road bears s. s.w., and gradually approaches mountains on left. The plain has here a breadth of from 8 to 10 miles, is undulating, and thinly covered with jungle. 7 miles, pass small village of Dehrooz; the greater part in ruin. Road beyond this becomes stony, and, turning w., passes round base of mountain on left. 9 miles, the village of Sadabad is passed about 1½ mile to right of road. Ruins of Shapoor are some 4 or 5 miles from this village in a direction s.s.w. About 12 miles, a guard and toll house is passed. The hills on right approach the road; and the small valley presents a broken appearance of rocks and undulations. 14 miles, a ruined serai. Beyond this, slight ascent, and 1½ mile further on the road enters the narrow defile of Tunge-Toorkoon. The road through this for 1½ mile is excessively rugged and difficult; quite impracticable for guns or other wheeled carriage. Precipitous rocks rise immediately on both sides of road, and so continue till road debouches into well-cultivated plain of Kumaridge. About 4 miles w. across plain, Kumaridge, small village; houses of stone. Water from wells; some brackish. Forage abundant.

Kumaridge to Konar-Tukht, 3¼ n. n., 12 m.

Road, bearing s., ascends and crosses some stony hills. Very soon after leaving village, about 1½ mile, arrives at bank of small stream, and enters with it a very narrow rugged defile; road stony and difficult, crossing and recrossing stream: at one place it is built over by stone archway. 2 miles, a toll and guard house is passed. Beyond this commences the descent of Kotul and Kumaridge (lit. the pass of Kumaridge). Road difficult, narrow, and with short zigzags, between huge masses of rock and stone; a horse only with

the greatest difficulty keeps his legs under him. For rather more than half an hour road is as bad as it can be, descending all the time. Scarped mountain sides and precipices rise abruptly from each side of road. A few determined men might here stop thousands. At 4 miles road is better, and gorge opens out. At 6 miles arrive on left bank of the Khoonazaberni, fine stream, some 30 yards wide: road follows along bank for about 2 miles, keeping also along base of mountains on left. 8 miles, the road, left to the right along the valley of river, proceeds to Kisht, distant some 4 miles. The left-hand road, turning s.w., crosses low spurs of mountains, and enters plain of Kisht (this plain is about 2000 feet above the level of the sea) and arrives at Konar-Tukht—seral and village of nomads. Villages adjacent supply provisions in abundance. Water in the wells here brackish; for travellers, good water is brought from a spring some 2 miles distant.

Konar-Tukht to Dalakee, 4½ H. R., 14 M.

By good road across plain for 3 miles; then suddenly commences the descent of the Kotul-e-Malu. Road, for three-quarters of an hour, very rugged and difficult. The zigzags over which road is taken are short. Large slippery masses of rock and stone are crossed. A brackish spring is passed half an hour from commencement of descent. On the right a lofty precipitous peak overhangs the road. At 5 miles, road, still descending, is somewhat better, and continues so till the right bank of the river is reached; distance 7 miles: road continues along bank and in stony bed of rivers. 8½ miles, cross to left bank; ford stony, about 25 yards wide. Water at this season (June) up to horses' bellies; owing to strong current, this in winter is a dangerous ford: both men and cattle have been lost in crossing at that season. Road passes complete ruins of two old bridges, about 2 miles asunder. 10 miles, road leaves valley of river, and, turning left, enters a confined rugged gorge, through which it lies, by a very stony bad road for 3 miles, then, descending spurs of mountains, enters the plains lying along border of Persian Gulf. Dalaki, some 70 or 80 houses; cultivation. River of Rohilla distant 1 mile, water of which is brackish. Along banks are large date-groves.

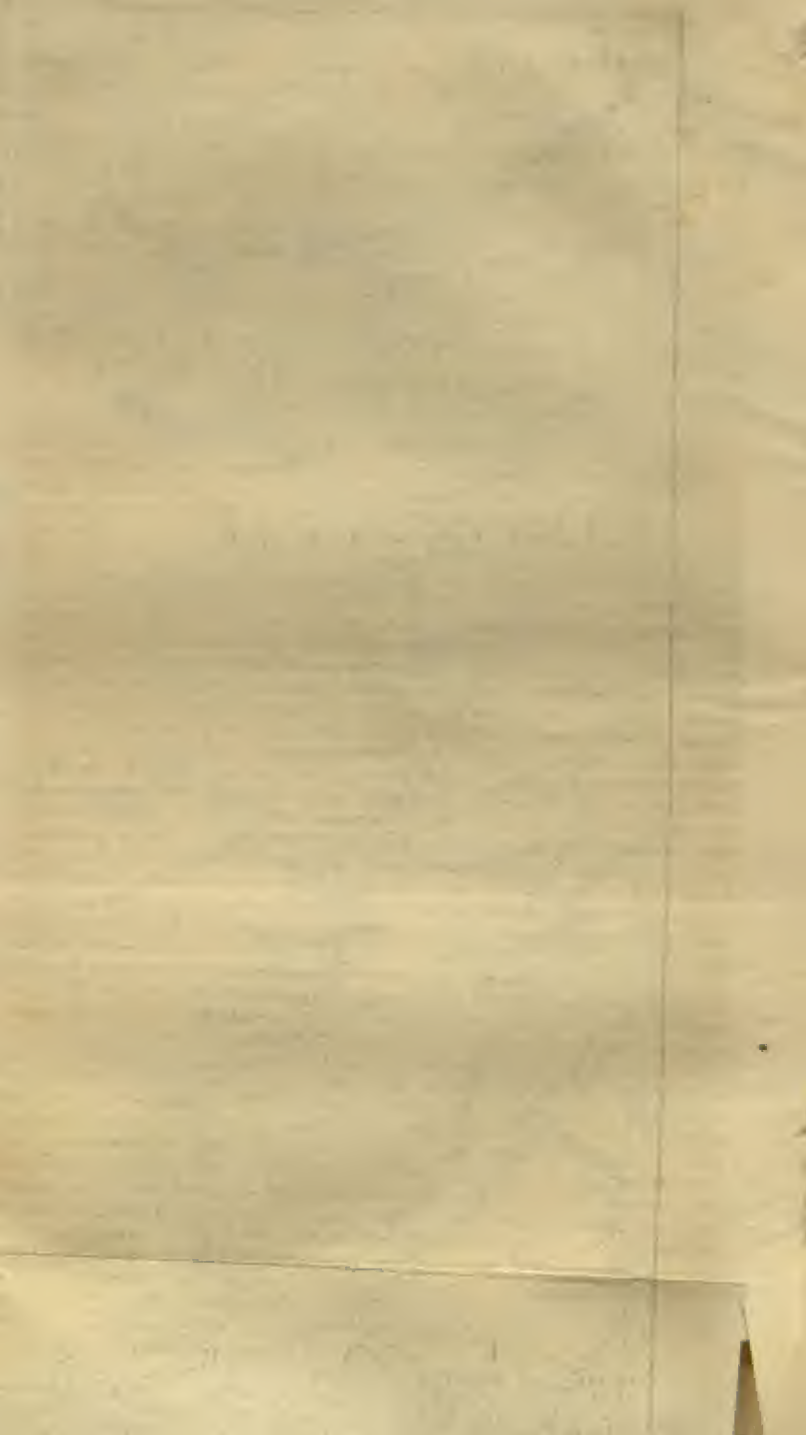
Dalaki to Búrasjún, 3½ H. R., 14 M.

Road bears s.s.e. parallel to base of mountains, which are some 2 or 3 miles to the left. The plain is thinly covered with shrub and bush. On the right there is a considerable extent of marshy ground, caused by naphtha springs. The air, for some 2 miles after leaving village, was strongly impregnated with smell of naphtha. Two streams impregnated with this mineral cross the road. At distance of 9 miles road turns away from mountains, and, bearing s.w., crosses an undulating country with low hills, the hollows of which are thinly wooded. Road, generally speaking, good, though in some places stony: soil mostly alluvial. Passing for about 4 miles over this sort of country, road approaches Búrasjún, the last mile being across level plain. To the s.w. and s. are large date-groves, distant some 2 miles. This is a walled town, with a considerable collection of houses outside the ruined defences of town. Provisions are abundant. Water is good from wells within the town.

Búrasjún to Chagudduk, or Ali-changi, 4½ H. R., 22 M.

Road bears s.w. across a perfectly level alluvial plain. Shortly after leaving village, road passes through, for some hundred yards, large date-groves. Kocshab, a small village on the right, is passed at 5 miles. Water brackish. Erawundi is passed on left, a little off the road at 11 miles; a tolerable sized village. 17 miles, Aradui on the right of road; date-groves and well of brackish water on left. Road hence over a dead level plain, on which neither tree nor grove is visible for miles around.





Ali-changi or Chagudduk to Bushire, 4 H. R., 16 M.

Road across a salt swampy marsh. The road-track is firm in fine weather, and makes a long sweep to the s. On the right is an arm of the sea.

C. CLERK, F.R.G.S.,

Lieut. 2nd Madras Cavalry.

May 1st, 1859.

V.—*Journal of Australian Exploration*. By MR. JOHN M'DOUALL STUART, Gold Medallist, F.R.G.S.

Read, March 12, 1860.

Friday, April 22, 1859.—Went to the top of Mount Hermit, and obtained the following bearings:—Mount Reynolds, 84° ; north-east point of North Lake Torrens, 28° ; the centre of ditto, 335° ; the small island, the nearest point to this hill, $344^{\circ} 15'$; south-west of lake, 291° ; Major Warburton's cone of stones, $197^{\circ} 30'$; $\frac{1}{2}$ mile north, $115^{\circ} 45'$; camp, 5° ; latitude, $29^{\circ} 32' 34''$. Sun's alt, $26^{\circ} 25' 45''$; index error, $1^{\circ} 30'$. The view from the top of Hermit Hill is very extensive from north-west to north-east of North Lake Torrens. I could see all round it; it is surrounded by low hills, and in the far distance there seems to be rising ground. To the south are broken hills, the termination of the Mount North-West range; that part of the country I shall examine to-morrow. Between this and the lake to the north the country is very rough; broken cliffs, with sand; the good country does not extend beyond 3 miles. Beyond this the lake is 7 miles distant; the springs are very numerous all round this mount, and seem to drain into the lake; they are round the hills from west to south; they give out an immense quantity of water, and there are many streams of water running from them. Round about the spring the ground is covered with a cake of soda and saltpetre; not salt, as many would take it to be. This mount is Mr. Babbage's Hermit Hill. It is my opinion there are more springs to the south, which induces me to search to-morrow before going to Chambers Creek. The little hills about it are visible from this. I intended to have moved on to Gregory Creek this afternoon, but took the precaution to send my stockman to examine it, in order to see what state the water was in. My reason for not going on at once to Chambers Creek is that it will be too far to examine the country between this and South Lake Torrens. My stockman has returned, and reports the water in the creek to be quite salt, and many of the small fishes dead. He also found some fossil shells, the mussel oyster; they have now become a solid limestone; they were found in a large circular piece of limestone, and very perfect.

Saturday, April 23.—Started at 8 A.M., with Hergott, to examine the country south of this, towards a high conical hill at the north-west point of the range. The country between this and the range is very good; in some places it is a little rotten, and a little stony; but the range is a beautiful grass country to the very top. In the creeks the grass and other plants are growing luxuriantly, but we could find no water. I was unable to prosecute the search as far as I wished, in consequence of my horse having lost a shoe and becoming quite lame, which forced me to return to the camp, where we arrived at 9 P.M. The view from the Conical Hill is very extensive, except to the south, which is limited. We saw smoke in one of the creeks to the east. I was anxious to examine the creek to the south-west, which we saw from the top of the Conical Hill; I therefore did not go to where the smoke rose, thinking that the blacks might only be hunting; I crossed the hills over

a good feeding-country, timbered with box or gum trees. It is the course of the one Major Warburton passed; we expected to find water in it from the great number of birds of all descriptions that were flying about. We followed it down, but were unsuccessful, although the birds continued all the way. There must be water about the hills in some place. At sundown my horse becoming very lame I was forced reluctantly to return. The flow of the waters is northward, into North Lake Torrens. On Monday I shall start again to the south-west, and leave the examination of the range to the south-east until my return. The Conical Hill is composed of white granite, with black spots. Mount Attraction bears $81^{\circ} 52'$; Reynolds, $72^{\circ} 32'$; Hermit, $319^{\circ} 48'$.

Sunday, April 24.—Sun's alt. LL, $94^{\circ} 54'$; index error, $1^{\circ} 30'$; it is rather cloudy, and I cannot depend upon it. Latitude, $29^{\circ} 33' 30''$.

Monday, April 25.—It has the appearance of rain, and should it do so, I am afraid I will be delayed here. The country will be very soft, so that I shall go to Chambers Creek to-day and examine the within country from there. Started at $9\frac{1}{4}$ A.M. on a bearing of 242° . The first portion of the country travelled over to-day, for 3 miles, was gravelly and rotten, scanty for feed, but afterwards it became very good indeed; on the banks of the two creeks passed by Major Warburton it was splendidly grassed; the water very salt. I sent the botanist to examine them to the north, and my stockman to the south, but they returned without finding any fresh water. They flow into Lake Torrens. After leaving the creek we passed over about 4 miles of sand-hills, very rich with feed, thence over some stony ground to the creek, all good. My course brought me about $\frac{1}{4}$ of a mile to the south of the creek, which I expected. Distance from the springs to this water-hole 2 miles. This is a very long water-hole, with plenty of water in it, and the feed good. We have passed some fresh tracks of natives, but have seen none.

Tuesday, April 26.—I intend to remain here to-day to fix this place, and examine the country about it. Sun's alt. LL, $23^{\circ} 38' 30''$; index error, $45'$ off; latitude, $29^{\circ} 39' 9''$. I sent my stockman in one direction and the botanist in another. They report immense quantities of water, also a great deal of salt water, with plenty of salt for the use of stations, and abundance of feed. The stockman saw some fresh tracks, but did not see any natives. The fires were still burning. The botanist saw an old man, a Luba, and a little one; they were very much frightened. When he approached they called out "Pompoy!" and moved their hands for him not to come any nearer. They seemed quite unwilling to hold any conversation; he therefore left them.

Wednesday, April 27.—Started this morning at sunrise, accompanied by the botanist, on a bearing of 165° ; 14 mile obtained following bearings:—Granite Hill, $89^{\circ} 30' 2''$; Mount Strangways, 190° ; Turret Hill, $164^{\circ} 30'$. Changed my course to $158^{\circ} 15'$, at 4 miles opposite the Mount Strangways; at $7\frac{1}{4}$ miles crossed a water-course; at 10 miles crossed a ten-tree creek, but no water; 11 miles opposite Turret Hill. At $11\frac{1}{4}$ A.M. ascended the hill for which I was steering, 18 miles. Obtained an observation of the LL, $92^{\circ} 7' 15''$; index error, $1^{\circ} 30'$; and the following bearings:—Hermit Hill, 28° ; Granite Hill, $69^{\circ} 45'$; Turret, 330° ; Mount Strangways, 316° . Started again $12\frac{1}{4}$ A.M.; at 1 mile changed my course to 30° , 1 mile to a place where I thought springs might be, but we could find none. At this point the sand-hills commence. The country from the creek to this point has abundance of feed upon it, but no water that I could see, although I have not the least doubt that there is some. After a little rain there must be plenty for a long time. No rain seems to have fallen here this season. There is no green grass except on the banks of the Chambers Creek. From this place I have changed my course to the south-east, in case I should miss the lake. At 8 miles saw some gum-trees on our east side; changed my course to examine them to 70° ; 3 miles, struck the gums, but found them to be a small hill of dwarf gums and

mally, surrounding a dry lagoon $1\frac{1}{2}$ miles broad by 3 long, quite dry. We followed it round, expecting to find some water at its shores, but were disappointed. East 1 mile, camped for the night without water; the horses being very tired coming through the heavy sand. We travelled to-day 30 miles; we were now upon a large open plain, stony, but plenty of vegetation. I do not doubt but water will be found upon it, but it required to be examined after a shower of rain that will put some water into the clay-pans; these have appearances of water round them; the drainage from the sand-hills that I have passed over seemed to be received by this plain. No sign of the lake. Latitude, $29^{\circ} 53' 58''$.

Thursday, April 28th.—Saddled by break of day. I must change my course to see if the water is still at Yarra Wirta; the horses are very much in want of it. If there is no water there, I shall have to go back to the creek, which will be very annoying, as my object is to see if that is an arm of the lake or a separate lake. Our course is 225° , $3\frac{1}{2}$ miles, over the points of the sand-hills; 4 miles, over a stony plain, with dry lagoons; changed to a high sand-hill to try if I could see anything of the lake. 150° , $3\frac{1}{2}$ miles, we are now in sand-hills again. Can see nothing of the lake, but I can see the hills at Yarra Wirta; to take a straight course would take me through the heavy sand-hills, which will not do for the horses if there is no water there: I shall therefore steer for the creek, and follow it down. 225° , for $3\frac{1}{2}$ miles, struck the creek a little to the north of where I crossed it on my former expedition. Followed the creek down, passed my former encampment; found no water there. Followed it down to where I considered it permanent, and found it still there; 8 miles, bearing 190° .

I will give the horses two hours' rest here, then proceed to the lake; if I can find no more water, I shall require to return here to-night, as I find that our course will be to the south of east; and as it is late in the afternoon, and most likely have to go the same course to-morrow, I prefer giving the horses the afternoon to recruit, and start early in the morning; they will be then able to do two good days' journey without difficulty, if we do not get water to-morrow night. Distance, $22\frac{1}{2}$ miles. The water comes from the banks, which are wet for about 3 feet above it, the water filtering through the slate; the creek has a slate bottom; there are some plants on the banks which are found on permanent water; about a month ago there seems to have been a shower of rain, for on examining the creek we found some rain-water in the holes.

Friday, 29th April.—Started at sunrise on a bearing of $96^{\circ} 30'$. 1 mile, opposite the west point of the lake the Yarra Wirta empties itself into it. It is distant about a mile. Changed our bearing to 88° , along the north shore of the lake. The bearing of the west shore is $146^{\circ} 30'$, the centre 131° ; the country close to the lake is very stony and scanty of feed; there is some water in it, but it is very salt; a few salt creeks run into it, but no great body of water. Ascended a long high hill to obtain an observation of the sun and to have a better view of the country. Sun's alt., $11^{\circ} 39' 15''$; index error, $1^{\circ} 30'$ off. The following bearings were taken:—east side of the lake, 151° ; Mount Deception, $121^{\circ} 30'$; Termination Hill, 97° ; Mount North-West, $58^{\circ} 48' 45''$; latitude, $30^{\circ} 8' 11''$. There is no appearance of any lake between this point and Mount Deception; it appears to be a stony plain, with some ridges of sand-hills, and there seems to be plenty of feed, but I did not see any gum-creeks. There may be some nearer the ranges. This hill, which I have named Mount Polly for distinction, is the easternmost of the flat-topped hills. Camp. Our return journey was across sand and small stony plains, some with cane-grass, dry swamps (that was after leaving the stony range), with plenty of feed.

Saturday, April 30th.—Sent Müller and stockman to build a cairn of stones

upon the highest of the three table-top hills, for the base-line of the survey; they are three remarkable hills close together, two can only be seen coming from the south and from the north-east. Alt. of sun's H , $90^{\circ} 56' 30''$; index error, $1^{\circ} 30'$; latitude, $29^{\circ} 40' 27''$. From the hill the men saw a number of native smokes to the westward on the creek, but have seen none of them.

Sunday, May 1st.—This morning we had a heavy dew. At noon got an observation of the sun. Lower limb, $90^{\circ} 19' 45''$; index error, $1^{\circ} 30'$; latitude, $29^{\circ} 40' 9''$. Went to the top of the three table-tops, and obtained the following bearings:—Camp, $117^{\circ} 15'$; Tent and Turret Hill, $161^{\circ} 30'$; Mount Strangways, $152^{\circ} 45'$; Tent Hill, also Mount Snip, $149^{\circ} 15'$; Mount North-West, south point, 113° ; second, 108° ; Granite Hill, $94^{\circ} 50'$; Hermit Hill, $76^{\circ} 30'$; Mount Hamilton, $331^{\circ} 30'$; next table-top to it, 326° ; North Table-top, $323^{\circ} 45'$; North Lake Torrens, west point, 27° ; Lake Phipps, 54° ; south-west bend of this creek, 221° , $1\frac{1}{2}$ miles; farthest bend, 213° of Mount. The creek south 1 mile. On the bearing to Mount Strangways will cut the creek $1\frac{1}{2}$ miles; to the point of the North-West range, $292^{\circ} 40'$; to the Small-nob range, 88° . From the top of this hill I had a fine view of Mount Hamilton and the lagoon where the springs are, and the other hills: they are the same hills that I saw on my north-west course when on my last journey. I described them as lying to the north-east, and the appearance of a light shade being at the foot of them; that light shade must have been the lagoon that I now see. The country is stony, but well grassed. The Hermit Hill I also saw when I first came to this creek.

Monday, May 2.—Müller and stockman are gone to build a cairn of stones on Mount Strangways, which I have fixed as the south point of my base line. Plotting and making plan. Sun's H , $89^{\circ} 47'$; index error, $1^{\circ} 30'$; latitude, $29^{\circ} 39' 15''$. The mean of all the observations that I have to-day here makes the latitude to be $29^{\circ} 39' 15''$.

Tuesday, May 3.—Started at $7\frac{1}{2}$ A.M. Ascended the east range, and got the following bearings:—Mount Hamilton, $317^{\circ} 45'$; the Twins, 267° ; Mount Strangways, 186° ; Tent Hill, $169^{\circ} 43'$; Turret Hill, $189^{\circ} 30'$; Mount Snip, 164° ; south mount, North-West, 111° ; Granite Hill, $97^{\circ} 15'$; creek, $1\frac{1}{2}$ miles; camp, 10° ; creek, east, $1\frac{1}{2}$: Mount Bitternut Hill, $75^{\circ} 30'$; next point, 41° . Left this point, $10\frac{1}{2}$ — $11\frac{1}{2}$ — $3\frac{1}{2}$ miles, to a low hill, and obtained the following bearings:—Twins, 244° ; Nob, 220° ; Mount Strangways, 196° ; Tent, 180° ; Granite Range, 103° ; creek, 1 mile; Hermit Hill, 81° ; creek, $\frac{1}{2}$ mile; Lake Phipps, $33^{\circ} 30'$; creek, $2\frac{1}{2}$ miles, 10° ; course, $351^{\circ} 30'$; to the creek, 4 miles; creek same course by the side of the creek, 9 miles, $1\frac{1}{2}$ miles, 10 miles, 200, 340° ; crossing tracks, $1\frac{1}{2}$; $\frac{1}{2}$ mile to the creek. Same bearing, got $1\frac{1}{2}$ mile, struck the Margaret. Obtained the following bearings:—Mount Hamilton, $276^{\circ} 45'$; Twins, $198^{\circ} 15'$; Nob, $177^{\circ} 30'$. To fix the large fresh-water holes, Mount Hamilton, 285° ; Twins, 203° ; Nob, $179^{\circ} 30'$; water-hole, $\frac{1}{2}$ mile east; returned to the camp more to the west to examine. The country we have passed over to-day is good. The Margaret at the junction is brackish, but not undrinkable; so are also some of the water-holes in Chambers Creek, running towards the lake, and will do for stock. There are plenty of fresh holes besides them. On our course back we crossed excellent feeding-country. The water is good for washing wool, as it contains soda.

Wednesday, May 4.—I intend to move to-day to the large water-holes westward, where I first struck the creek. It has very much the appearance of rain. I hope it will remain fine for a short time longer, until I finish my examination of the country. I could not have a better season to do it in, and prove the permanence of the water. There is no appearance of rain having fallen here this season, and what water there is now must be permanent.

Thursday, May 5.—Moved the camp to a better situation, ascended a hill, got some bearings to fix it, and built a cone of stones. Mount Strangways, 76° ; Nob, $46^{\circ} 30'$; Twins, 33° ; to the last point, 30° ; Turret Hill, 85° . The country is rather stony here for about $1\frac{1}{2}$ mile, from that to the range (Stuart's) are low sand-hills covered with grass, mulga-scrub, and acacia, with large dry clay-pans, from between which the creek, with the water on it for 3 miles, where it joins this. I have had it run up to the sources to-day; there is no more permanent water; the feed good. On the top of the north hills it is not so good, and very stony; it is table-land. The water-ponds still continue for 5 miles further up the main creek; there are immense numbers of small fish in the ponds, and on the banks there is a shrub growing that tastes and smells like cinnamon. We happened to stir up the sugar in a panikin of tea with a small twig of the bush, and it left quite the flavour of it in the tea. I have had Hergott to take sketches of some of the ponds, also the fish, and other remarkable things. It has been rather cloudy to-day, and I could not depend upon my observation. I must endeavour to get it to-morrow, and send the men on to build another cone of stones on a hill to the south-west, for another trig-station. There are numerous tracks of natives about, but we do not see any of them; we have also found some new plants in the creek. Bearing from the camp to the last cairn of stones, $112^{\circ} 45'$, to where the next cairn of stones will be, $228^{\circ} 15'$.

Friday, May 6.—Moved further up the creek on the south side to the last water that we know of: it is rain-water, very large, and will last a long time; well sheltered by gum-trees and other shrubs. The country is not so good, although there is plenty of feed; it is rather stony in some places. Our course to-day from the camp was 241° ; 5 miles thence, 320° ; $2\frac{1}{2}$ miles to the creek; thence 90° ; 1 mile to the water. It was too cloudy to get a good observation of the sun.

Saturday, May 7.—Sent Müller to see if there is any more water to the west; went to the top of a small hill, built a cairn of stones, to connect this point; the bearings are: to the last point $78^{\circ} 30'$; to the former one $64^{\circ} 45'$; Mount Strangways Hill, $76^{\circ} 30'$; to the Gums West, 270° ; camp, 62° . Sun's alt. $86^{\circ} 41' 15''$; index error $1^{\circ} 37'$ app.; latitude $29^{\circ} 44' 52''$. Müller returned after dark, and reports that there is no more permanent water. I shall start to the north to-morrow; the country is not so good to the west; it begins to get more stony, and less grass. Obs. of sun's LL, $86^{\circ} 41' 15''$; index error, $1^{\circ} 37'$.

Sunday, May 8.—Started to the north over the range, which is rather difficult to get the horses up and down. On the top it is very stony, with salt-bush, and grass scanty; there is also a ridge of sand here running along the centre, with good feed. We descended into an undulating stony country, with plenty of grass and salt-bush, crossed the Margaret and salt-creek, in which there is water; some salt and some brackish, but not unfit for the use of cattle. There is abundance of feed all round. We arrived at Hamilton Springs a little before sundown. Distance 20 miles.

Monday, May 9.—Mount Hamilton. Some of the horses require to be shod to-day. I shall also require to build a cairn of stones upon Mount Hamilton (the one built by Major Warburton having fallen down), and get an observation of the sun, which is—LL $86^{\circ} 9' 15''$; index error, $1^{\circ} 45'$ app.; lat. $29^{\circ} 27' 37''$. The springs are certainly very remarkable, and Major Warburton gives a very good description of them. I got the following bearings on the top of the Mount:—Hermit Hill bearing 102° ; Nob, $137^{\circ} 30'$; Twins, 151° ; Mount Hugh, $319^{\circ} 45'$; Beresford Hill, $306^{\circ} 30'$.

Tuesday, May 10.—Started for the Beresford Springs; course 320° to Mount Hugh, at $4\frac{1}{2}$ miles, and passed on the north side of Coward Springs, distant $\frac{1}{4}$ of a mile. I did not go to look at them, they do not appear to be anything

very great. I shall leave them until I return, the day after to-morrow; from the appearance of Mount Hugh, I expect something good.

At 11 o'clock A.M. arrived at Mount Hugh, 7 miles distant from Mount Hamilton, and, as I anticipated, found a splendid number of springs; they give out a copious stream of water; named them the Elizabeth. There is enough water running to drive a flour-mill in two or three places. They are really remarkable springs, such a height above the level of the plain. I saw them from a hill on Chambers Creek (The Twins). From whence do they derive their supply of water, to cause them to rise to such a height? It must be from some high ranges to the north-west, or a large body of fresh water lying on elevated ground. This is another strange feature of the mysterious interior of Australia. I shall remain here until after 12 to-morrow, to get an observation of the sun to fix this hill. I shall return to Mount Hamilton, and proceed to examine the country west of North Lake Torrens, for one of the east runs, which will complete my survey of them, from which place I shall despatch a messenger to Oratunga.

Wednesday, May 11.—The obs. of the sun's Lt, $85^{\circ} 26'$; index error, $1^{\circ} 45'$ app.; lat. $29^{\circ} 17' 43''$. I omitted to mention yesterday that, 2 miles before we reached Beresford Hill, we crossed Pasley Ponds; saw one of the Major's camps. The water is brackish, but not bad; the white deposit round these springs (also the Elizabeth) is soda. In returning, I examined the Coward Springs. The water is good, and running; there is a plentiful supply. It was dark when I arrived at Mount Hamilton. I saw some natives to-day, four in number, but they gave us a wide berth; they do not like to come near us.

Thursday, May 12.—Some of the horses require shoeing, and I wish to get another observation of the sun. I shall remain here to-day, and examine the country to the north-east. About 7 miles in that direction is the salt-creek of Major Warburton. The country is of a light sandy soil, covered with grass.

Friday, May 13.—Started to the eastward, to see what that is made of. Completed the survey of the runs and springs. I think there must be some more before we reach the lake. To the south of east, about 4 miles, we discovered four springs not seen by the Major. There is a plentiful supply of water, and would be more if opened: one choked up with reeds, the other two are running. The ground moist all round. Saw some natives; they seemed frightened at first, but were induced to come close up. They were very much amused at our equipments. Two had seen a party of whites before. They knew the name of horse, but no more; they call water, *maunce*, and some of their words very much resemble those of the natives in Port Lincoln. We could make nothing of them. They repeat every word of the question we ask; they followed us over to the Margaret, and took us to some fresh-water springs in the creek, which is very good; the water is very good; there is a quantity of reeds growing round them, also tea-tree. From this we followed the creek to the north, thence north-east towards the lake, but the water being too brackish I returned to the springs, the natives walking with us all the time; they seemed very inoffensive. The country travelled over to-day is of the same description, all good. In following down the creek, another native joined us from the creek with a net in his hand, in which were some small fish: the net was a hoop one, well made.

Saturday, May 14.—The morning very cloudy, every appearance of rain; saddled and proceeded in search of Emerald Spring. On a north course, at 7 miles, made Mr. Babbage's old camp on a sand-hill; camped a little way from it, not knowing the position of the spring. Hergott informs me that it is 3 miles to the west. It commenced raining before we started, has rained all the way up, and is still doing so: it is a very light rain, but there is a very

strong, and very cold wind from the south-west; intended to have brought up my plan, but the rain and wind prevent me.

Sunday, May 15.—Warner Creek. It cleared up during the night, but the clouds have come up again this morning, and look very threatening. Sent Hergott to find the spring; the wind still from the same quarter, and too strong for me to do anything to the plan, which is a great annoyance; for from this place I shall finish the survey of the runs, and send the stockman back to Oratunga with the plan. Hergott did not return until after sundown; he could not find the spring.

Monday, May 16.—Sent Müller to the west; obtained an observation of the sun, but not a good one; engaged with my plan. Müller returned at 10 o'clock, having found the spring, bearing to it 129° , about $2\frac{1}{2}$ miles distant from this camp. It is not hot, but a little warmer than milk-warm. There is a good stream running from it, and the water is excellent; to me it has a mineral taste, very good. In the creek down in the lake there is some water, but it is salt. There are a number of small fish lying dead on the bank near the mouth; they seem to have been left there by the retiring of the flood; they are quite dried up. I intended to have taken some with me, but they are too dry, nothing but skin and bone. The creek empties itself into the lake, about a mile north, from where Chambers Creek goes into it. Distance from this camp about 5 miles.

Tuesday, May 17.—Again very cloudy, with a little rain; finishing the survey. Could not obtain an observation of the sun. Wind same way very strongly.

Wednesday, May 18.—Clearing up; hope it will do so, and let me get an observation; engaged with survey, and preparing tracing for town. An observation of the sun's alt. $81^{\circ} 53' 45''$, index error, $1^{\circ} 45'$ app.

Thursday, May 19.—Finishing tracings, &c., for town. Sun's alt. $81^{\circ} 23'$; index error, $1^{\circ} 45'$ app. 3 miles; thence 5 miles to the creek, bearing to where I struck the creek on my previous journey $222^{\circ} 30'$, 4 miles, and obtained the following bearings:—First Hill Turret, $96^{\circ} 80'$; Mount Strangways, 86° ; Nob, 49° ; Twins, $33^{\circ} 45'$; Mount Hugh, after Mr. Chambers' youngest son; to our camp for to-night 22° . $2\frac{1}{2}$ miles, about 4 miles from last night's camp, the chain of large water-holes commence, and continue beyond to-night's camp. They are, indeed, most splendid water-holes, not holes, but very long ponds; they are nearly one continuous sheet of water, and the scenery beautiful. I am sorry I did not name it a river in my former journal. On our course we passed small water-holes, but I do not think they are permanent, although they will last a long time. A tributary joins, at which I first saw the creek has permanent water in it. Three miles up it seems to rise from the north hills. I must bring my survey up to this point to-morrow; it is very cloudy to-night, with a strong wind from the south-west, from which the clouds are coming. The country is a little stony, but well grassed, sprinkled with salt-bush; but there is still green-feed on the banks.

Friday, May 20.—At sunrise started stockman for Oratunga with tracings, letters, &c.; with orders to proceed to Finlay Springs, thence to Hergott Springs, thence to St. Beckett's Pool, thence to Mt. Glenna, thence to Mt. Stuart, thence to Oratunga, taking six days to perform the journey to Oratunga. Preparing my other plans for a start to-morrow for the north-west to see what the Davenport range is. Obtained an observation of the sun's alt. $81^{\circ} 4' 30''$; index error, $1^{\circ} 45'$; lat. $29^{\circ} 23' 20''$. Index error 2° off compass.

Saturday, May 21.—Started at 8 o'clock on bearing of 310° , for the Davenport Range, 20 miles; Beresford Hill, bearing 253° , about 22 miles. Changed to examine a large lagoon to the south-west of us bearing 238° , distant 2 miles. Changed to 310° , the original course, 4 miles came upon some rain-water, and

camped for the night where there is abundance of feed. Distance to-day 20 miles. The journey has been over low sand-rises, with long valleys between, covered with grass, and very little salt-bush. Examined the lagoon for springs but found none. I suppose it receives Major Warburton's salt-creek: it is covered with a white substance, is dry, and is 7 miles long by 3 broad, running north-east and south-west. On the south-west side it is bounded by steep cliffs and high sand-hills on the top; the feed has been excellent throughout the whole way: the sand-hills are running north-east and south-west, and can be travelled over with the greatest ease. Nothing remarkable has appeared to-day.

Sunday, May 22.—Sent Hergott to examine the south-west side of the lagoon we passed last night, with orders to overtake me by half-past 11 o'clock so that I may get an observation of the sun at noon. Did not get a start till 9-15, the horses having strayed some distance during the night. Started on the same bearing, 310° . Stopped at 11-20 for Hergott to come with the instruments; but owing to the horses having strayed he was not able to reach me until a quarter past 1 o'clock, which caused me to lose the observation. We have come over low sand-hills with plenty of feed. Large clay-pans dry. There are high hills apparently in view a little more to the north, for which I shall alter my course to 328° . To this point 8 miles. $1\frac{1}{4}$ o'clock started over 2 miles sand-hills: the country then became stony, with less feed, and became bad as we approached the hills. A stony plain to the north-east, but no sign of the lake. We passed two broad watercourses within 2 miles of the hills. Ascended the hill, but could see nothing but the same country all round: proceeded on for about 3 miles on a stony rise where there is a little wood. Saw two native smokes a considerable distance to the south-west. No permanent water the last two days. We still get a little rain-water, but it is getting scarce. There does not seem to have been so much rain here as to the eastward. Distance to-day 20 miles.

Monday, May 23.—Started towards the Davenport Range over the same description of country as yesterday afternoon, but improving rapidly for 7 miles. The sand-hills again commence, with beautiful feed upon them: low with broad valleys; they continued for 6 miles, when the stony plains again commence. The range in view: the highest seems to be at the north-east point, which has the appearance of a detached conical hill. At $3\frac{1}{4}$ miles from the last of the sand-hills saw the Douglas. Changed bearings to where the gums were thickest to $228^{\circ} 30'$, and at $1\frac{1}{4}$ miles struck the creek, but no water in it. There are numerous gum-trees, but not very large; also plenty of myall; many small channels, very sandy, and very loose soil which will not retain water. We followed the Douglas down for 3 miles to see if there was water; but no sign of it, the creek still continuing broad and sandy. I was obliged to return to where I struck it because it was nearly sundown; and I had found a little rain-water, about a mile to the south, which will do for our horses in the morning.

Tuesday, May 24.—Douglas. Hergott's horse in want of shoes. Cannot get a start until late. Found a little more rain-water in a clay-pan. I can find no water near the range. I shall have to fall back upon Strangway's Springs. I am anxious to see what is on the other side of the range or I would run this creek down; by doing so it would take me too far from the range, as its course seemed to be south-east when I left it last night. There are numerous native-tracks about the creek. We have also seen three fires three or four days old, but not anything of the natives. Obtained an observation of the sun's $\text{L. } 80^{\circ} 36' 45''$; index error, $2^{\circ} 15''$; $\text{Lat. } 28^{\circ} 45' 4''$. Started at 12-30 on a bearing of 313° for the highest point of the range east over stony table-land, the creek running in the same direction for 4 miles; it then turns to the westward, and I lost sight of it among some hills. At 10 miles struck a creek studded with numerous box-trees, the bed of sand and gravel, but no water.

At 11½ descended from the table-land, and arrived at a gum-creek at sundown; the bed the same as the former, and no water. There are numerous native foot-tracks in the creek. It is broad, and divides itself into a number of channels too sandy to retain water. I am sorry I could not reach the range to-night. We had some very bad ground to travel over, and no water. Throughout the journey of to-day the country has been stony and poor; little else but salt-bush, with plenty of ironstone and quartz-pebbles. In the creeks myall is growing: the gums of this creek differ a little from those of the other creeks which I have passed. No water to-night.

Wednesday, May 25.—Examined the creek for water, but found none. Started in the same course as yesterday, 313°, for the north-east highest point, which I suppose to be the Mount Margaret of Major Warburton. Native-tracks seen in the creek. There may be water some distance down the creek, but here it is too sandy to retain it. At 4 miles struck another gum-creek in turning round the south side of the range; of the same description as the others; too sandy to hold water. Proceeded towards the highest point of the range and obtained an observation of the sun within 1½ miles of the Mount—alt. of sun's L., 80° 45'; index error, 1° 45' off; bearing of the Mount, 303°. Changed to north 1½ mile to a creek that was coming from the Mount. Left the horses in charge of Miller and ascended the Mount, which was very difficult. It took us an hour to go up, and three quarters to come down. The hill is composed of a greenish slate, at the base lying horizontally, quartz and granite-courses with ironstone, but I can see nothing of Major Warburton's quartz-cliffs; they must be more to the south-west. The range has a very peculiar appearance: from a short distance it seems to be an immense number of conical hills all thrown together; they are very rough and rugged. From the top the view to the north-west was hidden by a higher point of the range. To the north-north-west there is another range about 20 miles distant, apparently higher than this, running south-west by north-east, and at a north line drops down into a large stony plain. To the north is another far-distant range; to the north-east broken hill and stony plain, with a number of clay-pans; to the east a large stony plain with a number of creeks running to the eastward. Coming from this range they become gum-creeks further down, but on and close to the range they have myall-bushes and other shrubs. No water to be obtained in the range. Changed my course to north-east to examine a white clay-pan that has the appearance of being springs. At 3 miles came upon the lagoon, and was very much disappointed to find it salt. This being the second day that the horses have been without water, I must give up the search for springs, and return to 1 mile to the south of the Douglas, where we found a little rain-water. It being nearly sundown I made for the last large gum-creek, striking it lower down, also cutting the other creeks between in the hopes of finding water in some of them, but there is none. Made the large gum-creek at 10 o'clock. Camped for the night. Horses very much done up in consequence of the ground that we have been travelling over being so rotten and stony. The country is not good near the range; but at 3 miles to the east it becomes less stony and better grassed. In the creeks there is plenty of grass, but no water.

Thursday, May 26.—Started at daylight for beyond the Douglas; at 3 o'clock arrived at water; horses very much fatigued. I should require to give them two days' rest to recruit, if the water will hold so long, and then I must return to the Strangways Spring, that being the only permanent water known. There are some heavy clouds coming up from the south-west, which I hope will bring rain. Sundown, we have had a slight shower of rain, but it will not assist me much; it is very vexing to see it all blowing away. I should like to have seen those very distinct ranges to the north. From the

Mount there was no appearance of any lake to the north-east nor east; it must be a long way off.

Friday, May 27.—Douglas. The horses look very much in want of rest this morning. Rain all gone; very sorry for it; can't help it. Obtained an observation of the sun's L.A. $79^{\circ} 36'$; index error, $1^{\circ} 15'$ off; latitude, $28^{\circ} 46' 11''$. Horses not looking at all refreshed, but a little rest will recover them.

Saturday, May 28.—Horses look better this morning, but still think it advisable to give them another day's rest. I have sent Müller down the creek to the eastward to see if there is any water in it. I should have gone again to-day to the Davenport range, to see if I can find the quartz-reefs, by striking it more to the south-west; but it would be too much for the horses, which are my mainstay, and this water will not last longer than to-day—it is going very fast. I do wish it would rain, for I hate going back. Sundown. Müller has returned; has been about 12 miles down the creek, but can find no water. It still continues sandy. He shot three new parrots. Sun's L.A. $79^{\circ} 10'$; index error, $1^{\circ} 30'$ off; latitude, $28^{\circ} 17' 17''$.

Sunday, May 29.—Not being satisfied with my hurried examination of the range, and as the hills have the appearance of producing water, I shall make another attempt to find it; if we do not, I shall have to fall back upon the springs. Started on a course of west-north-west. Crossed the Douglas three times; it turned to the south-west. I continued my course over low hills and valleys, with plenty of feed, with quartz, ironstone, and granite—the quartz predominating, also a few reefs of slate; no appearance of a gold country. At 15 miles changed a little more to the north towards a rise; the country becomes very broken and rough; sand and ironstone, lime and slate, with but few quartz, but still plenty of grass. At 20 miles crossed the upper part of the gum-creek that I camped on on the 25th instant; the banks are slate; cliff nearly perpendicular. Followed up the creek for two miles, but no water; the bed is sandy, and in some places very stony. Not finding water, I continued my course for the rising ground. At 6 miles I find that I am getting upon high table-land, and, the sun being nearly down, I returned to the creek, where there is some green-feed for the horses, as they will be without water to-night. From the high ground I can recognise the hills on my former journey. The gum-creeks that I am now passing are those that I crossed after leaving the stony desert-land, and the tableland I suppose to be the good country with grass and salt-bush. It was after sundown before I reached the creek and camped.

Monday, May 30.—Started at sunrise, determined to follow down the creek (which I have named Davenport Creek), for I think there must be water somewhere before it enters the plain. The flow is to the east. At 5 miles, came upon a beautiful spring in the bed of the creek, for which I am truly thankful. I have named this the Spring of Hope. It is a little brackish, not from salt but soda, and is very good, running a good stream of water. I have lived upon far worse water than this. To me it is of the utmost importance, and keeps my retreat open. I can go from here to Adelaide in any time of the year and any season. Camped for the rest of the day. Sun's L.A. $78^{\circ} 59'$; index error, $1^{\circ} 45'$ off; latitude, $28^{\circ} 33' 34''$.

Tuesday, May 31.—Some of the horses require shoes. I must examine the range a little more before I leave. Alt. sun's L.A. $78^{\circ} 41'$; index error, $1^{\circ} 45'$ off; latitude, $28^{\circ} 33' 34''$. Shoeing horses, and repairing other things.

Wednesday, June 1.—Not being satisfied with my hurried view of the salt clay-pan that I visited on the 25th ult., I have sent Müller to-day to examine it for springs before I proceed to the north-west. On a further examination of the water I find a very large portion of magnesia in it, and also salt, but very little. Alt. of sun's L.A. $78^{\circ} 24'$; index error, $1^{\circ} 45'$ off. Müller has returned,

and, as I expected, found a small spring of very good water on the banks of the salt-creek. I expect there will be others, and shall move down there tomorrow and examine it. I think we have fallen upon the line of springs again, which I hope will continue towards the north. No rain seems to have fallen here for a long time.

Thursday, June 2.—Started at 9 o'clock for the springs, and arrived there in the afternoon. Travelled over a stony but very good feeding-country, plenty of grass and salt-bush; it becomes better as we approach the springs. There is a creek with large water-holes, and around the small hills are numerous springs. On the banks of the creek and round the springs an immense quantity of rushes, bulrushes, and other water-plants are growing; the quantity of land they cover is very great—some square miles. Some of the springs are choked up; others are running, though not so active as those further to the south; round about them there is a small crust of saltpetre, magnesia, and salt. The water of the springs is very good, but that of the creek is a little brackish, but will do very well for cattle. Some of the holes in the creek are rather salt. There is enough of good water for the largest station in the colony round the small hill where I am now camped. There are 12 springs, the water first-rate. All the low hills and plains round about have plenty of grass upon them, and seem to be continued as far as we can see. The hills are composed of slate, mica, quartz, resembling those of the gold country; ironstone, mica in them all. I obtained an observation of the sun to fix the mount, which was—sun's LL , $78^{\circ}26'30''$; index error, $1^{\circ}7'$ off; lat. $28^{\circ}24'17''$; mount bearing $267^{\circ}45'$. One of the horses seems to be very unwell to-day; he has endeavoured to lie down two or three times during the journey, but I hope he will be better by the morning. I have named these Hawker Springs, after George C. Hawker, Esq., M.P.

Friday, June 3.—I find that the horse is too unwell to proceed; I shall give him another day, for fear I should lose him altogether. I have sent Müller to see if there are any springs round an isolated hill to the east, about 6 miles. He states that the creek flows past that hill, and on towards other hills of the same kind; the springs continue to within $\frac{1}{2}$ mile of the hill. There he found two large springs running over, covered with long reeds. I do not doubt but that they still continue on towards the lake, wherever that may be, which I intend to examine on my return. All good feeding-country, and improving as he went east.

Saturday, June 4.—This morning the horse does not look much better, but still I must push on. Started at 8 o'clock, course $323^{\circ}45'$, towards the highest point of the next range. At 1 mile struck a gum-creek coming from the Davenport range, and running to the north of east; the bed sandy and grassy. At 4 miles another gum-creek of the same description, the gum-trees stunted. At $8\frac{1}{2}$ miles three creeks, joining at about $\frac{1}{2}$ mile to the east; the centre one is gum, and the other two myall. At 12 miles changed my course to 29° , to examine three dark-coloured hills, where I think there will be springs. At a mile and a quarter came upon a small batch of springs round the north side of the hills, in a broad grassy valley, with plenty of good water. Changed my course again towards the highest point of the range, to 310° . At 1 mile myall and gum-creek; at 3 miles another gum-creek; at 7 miles a very large and broad gum-creek spread out into numerous channels. I have not the least doubt but there is water above and below, judging from the numerous tracks of natives and emus treading in every direction. As this is the largest creek that I have passed, and likely to become as good as Chambers Creek, which it very much resembled, I have used the liberty of calling it the Blyth Creek, after the Honourable Arthur Blyth. I am finding so many springs in my course that I consider it would be a loss of time to examine the ranges to the east. I have named the range to the eastward the

Hanson Range, after the Honourable R. D. Hanson. I expect to cut it in a day or two, as its apparent course inclines towards me. At $9\frac{1}{2}$ miles I ascended the highest point of the range, built a cone of stones thereon, and named it Mount Younghusband, after the Honourable W. Younghusband, M.L.C. From it I had a good view of the surrounding country. To the south are another batch of springs; bearings from this 184° , about 5 miles distant, apparently very large, and another one a little more to the west, bearing 199° . To the north-west there seems to be a greater number; also another isolated range about the same as this, I should think about 700 feet high, which I have named Mount Kingston, after the Honourable G. S. Kingston, Speaker of the House of Assembly. To the north the broken ranges continue, and in the distance there is a long flat-topped range, broken in some places from south-east to north-west. It seems closing upon my course in the last bearing; I cannot judge of the distance, the mirage being so great. To the north-east, east, and south-east is the table range. Between there seems to be a plain, with numerous creeks, well grassed, with the appearance of many springs all over it. Descended from the mount, and proceeded round the east side of it to the same springs that I saw from the top, bearing 336° . Mount Margaret bears from the top 161° ; Mount Kingston, 329° . As we were rounding the mount to the east we found eight springs before we halted, in a distance of 3 miles; some were running, and others were choked up, but soft and boggy. At dark arrived at another batch of springs; not those I intended going to. They are on the banks of a small creek, close to and coming from the range. They are not so active as the others, and taste a little brackish; they are coated with soda, saltpetre, and salt. The horse seems to be very ill; has attempted to lie down two or three times. I cannot imagine what can be wrong with him.

Sunday, June 5.—I must remain where I am to-day. The horse is so bad that he cannot proceed; he neither eats nor drinks. I have sent Müller to the west side of the mount, to see the extent of the springs; they are on the banks of a creek, which has brackish water in it, large and deep, and a great quantity of rushes. The water comes from the limestone banks, which are covered with soda. He rode round the mount. It is all the same, and the feed is splendid to the top of the mount. Some parts of our course yesterday were rather stony, and scanty of feed; but as we approached the mount it became better, and close to the mount it is as good as could be wished for. Although the grass is dry, it is in abundance, and to the east and north-east the plain seems to be of the same character. It is a wonderful country, scarcely to be believed. I have had one of the most brackish of the springs opened to-day, and the water to-night tastes excellent; it could not be better. Native-tracks about; but I am surprised we see no one; their old fires we are passing constantly. Sun's L., $78^{\circ} 27' 15''$; error, $1^{\circ} 7'$ off; lat. $28^{\circ} 1' 32''$.

Monday June 6.—Mount Younghusband. The horses being some distance off, and my horse requiring a shoe, I am unable to make a start until 10 o'clock, on a bearing of $307^{\circ} 45'$, passing Mount Kingston on the south-west side. At three-quarters of a mile came upon the springs that I intended to have camped on on Sunday night; they are flowing in a strong stream, enough to supply any number of cattle. I named these the Barrow Springs, after J. U. Barrow, Esq., M.P. At $1\frac{1}{2}$ mile other small springs; at $2\frac{1}{2}$ miles found a myall-creek; at 3 miles crossed 4 myall-creeks; at $4\frac{1}{2}$ miles struck a large broad valley, in which are the largest springs I have yet seen. The water that is coming from them is immense, flowing in numerous streams, and the country round beautiful; their extent is very great. These I have called the Freeling Springs, after the Honourable Major Freeling, M.L.C. After leaving the springs I ascended a rough stony hill, to have a view of them; but I could not see them all, their extent is so great. They extend beyond the Kingston range, and how much further I do not know. From this point changed my course to

322°; distance from last camp to this $4\frac{1}{2}$ miles. I can just see the top of a distant range, for which I will go on that bearing. At $1\frac{1}{2}$ mile crossed a broad gum salt-creek coming from the west, with a quantity of salt water in it, this I have named Peake Creek, after C. J. Peake, Esq., M.P. After crossing this we travelled over low rises with quartz, ironstone, and slate; the quartz predominating. The country has the appearance as if it were covered with snow from the quantity of quartz. At 11 miles passed a brackish water-creek and salt-lagoon. Searched for springs but could find none, although there are a number of reeds and rushes, but no water on the surface. I thence proceeded three-quarters of a mile and struck a gum-creek with a number of channels and very long water-holes, but the water is brackish; it would do for cattle. This I have named the Neale, after J. B. Neale, Esq., M.P. I think by following it down there will be a large quantity of water, and good, and will become a very important creek. No person could wish for a better country for feed than that we have passed over to-day. It resembles the country about Chambers Creek.

Tuesday, June 7.—At 8 o'clock started on a bearing of 160° for the northernmost of the isolated hills, to see if there are springs around them. At 4 miles ascended it, but could see no springs. This I have named Mount Harvey, after John Harvey, Esq., M.P. From Mount Kingston bears $47^\circ 45'$. Thence I started for the other mount, which I have named Mount Dutton, after the Honourable F. T. Dutton; $4\frac{1}{2}$ miles to the top. All the country to the north-west is the same. There is no appearance of any more springs. The Hanson Range is closing upon my course, and I think to-morrow's journey we will cross it. On the north side are a few springs; some of them are a little brackish, and some very good. We have cleared out one and found the water very good. Here I camped for the night. I am afraid the springs are about to leave us. From south-west to north-west it seems to be an immense plain, stony on the surface, with salt-bush and grass. Mount Dutton is well grassed to the top; it is composed of the same rock as the others.

Wednesday, June 8.—At 9.15 started on a course of 310° . At three-quarters of a mile passed another batch of springs, some of them brackish and some very good indeed. Leaving them we passed over a good feeding country, crossing several gum and myall creeks, one with polygonum, all coming from Hanson Range and flowing into the Neale. At 9 miles crossed the top of Hanson Range. From it I could see about 15 miles to the west of north, the highest point of the range, which I have named Mount O'Halloran, after the honourable and gallant Major O'Halloran. On the west side of Hanson Range there appears to be a large creek coming from the north-west and breaking through the range a little to the north of west from this point, which I think is still the Neale. We then proceeded on a course of 324° towards Mount O'Halloran. At $4\frac{1}{2}$ miles struck a large gum-creek coming from the range and running for about 4 miles north-west on our course. Examined it for water, but found none. It divides itself into numerous channels, and when full must retain a large quantity of water for a long time. The gum-trees are large and numerous, and numbers of pigeons frequent its banks. At a mile further came upon some rain-water in a stony flat, where we camped for the night. The country on the north-west side of the range begins to improve very much, although stony. We are now camped between low sand-rises covered with grass. There must have been some rain here about a fortnight or three weeks ago.

Thursday, June 9.—This country must be examined to-day for springs, and to ascertain if there is permanent water in the creek. The horse is getting better, and will be the better for a day's rest. I have therefore sent Muller down the creek to search that, whilst I must remain and get an observation of the sun. My party is far too small to examine the country well. I cannot go

myself and leave the camp with the provisions to one man; the natives might attack him and destroy the lot. There seem to be a great many tracks about. 3 o'clock.—Müller has returned; he has run the creek down until it joined another very large gum one coming from the north-west. The one that I saw from the top of the range is also spread out into a number of channels. The gum-trees large. From some of these trees the natives had cut a large sheet of bark, evidently for a canoe. He also saw two large water-holes, 100 yards wide and $\frac{1}{4}$ mile long, with very deep and steep banks. It seems to be the same creek as the Neale. Can it be Cooper Creek? The country very much resembles it. My course will strike it more to the north-west to-morrow.

Friday, June 10.—I have been very unwell during the night with cramp in the stomach, but hope I shall get better as I go on. Started at 8 o'clock on a bearing of $32^{\circ} 4'$. At 4 miles went to the top of Mount O'Halloran. The creek is about 3 miles distant west; it breaks through the Hanson range at 190. From this to where the creek comes from, 280° , other two branches join in this bearing at about 2 $\frac{1}{2}$ miles. Distance from the camp to the mount 4 miles. From the mount changed my course to 317° to get away from the stones, which are very rough close to the hill. At 6 miles changed my course to 270° to examine an isolated hill for springs, but found none. I am afraid they have turned to the west. The creek winds round this hill and spreads out into numerous channels, covering a space of 2 miles. There is no water here nor for 3 miles further up the creek, but we have found some rain-water on the banks. Being too unwell to ride I have camped here for to-night, and sent Müller to examine the creek for water, but he was unsuccessful. The country travelled over to-day is very good, with a few stones on the surface; but the banks of the creek for 2 miles are beautifully grassed. Before changing to the hill we crossed a low mound of gypsum, with stunted box, running at right angles to our course.

Saturday, June 11.—I feel a little better this morning. Started at 9.20 on a bearing of 317° . Crossed the creek, which is about a mile wide. For 5 miles it ran parallel to my course, then turned more to the west. There is a most beautiful plain along the banks, about 3 miles wide and completely covered with grass. At 9 $\frac{1}{2}$ miles, in a small rise, changed my course to 318° to a distant hill. For 9 $\frac{1}{2}$ miles travelled over another large and beautiful plain of the same description; thence over some low, stony hills, well grassed. Entered upon a myall-flat; the soil beautiful, of a red colour, covered with grass 4 miles; it then becomes sandy, and at 31 miles sand-hills commence, very low, with plenty of grass. Camped for the night. The sand-hills seemed to extend a long way. To the north of east are some high hills, all trending towards the north-west. The country travelled over to-day surpasses all that I have yet gone through for the abundance of feed. We have passed a number of native-tracks—only one or two fresh ones. We have found no water to-day, except some little rain-water, which is nearly all mud. I have no doubt but there is plenty towards the east.

Sunday, June 12.—I feel still very unwell. We are now come to our last set of shoes for the horses, and, having experienced the misery of being without them on my previous journey, it is with reluctance that I am forced to turn back. My party is also too small to make a proper examination of such splendid country. Started back, keeping true to the east, to examine a high hill in search of water. If I can find water, I shall endeavour to reach the north boundary. At 20 minutes to 12 o'clock arrived at the hill, and obtained an observation of sun's L.A. $78^{\circ} 48' 15''$; index error, $1^{\circ} 30''$; latitude, $27^{\circ} 12' 30''$. Can see no appearance of water, although the country appears good all round. 10° to the east of north is a large, dark-coloured hill, which I saw from last night's camp, from 15 to 20 miles distant. I should like to go to it, but can find no water; all round the hills it has a promising appearance. I have

named it Mount Browne, after J. H. Browne, Esq., of Port Gawler, my companion in Captain Sturt's expedition. I dare not rest the horses another night without water, the grass is so very dry. Had there been green grass, I would not have hesitated a moment. Turned towards the Neale by a different course to try and find water. Was unsuccessful, until, within an hour of sundown, we struck some muddy water. As I expected, the horses were very thirsty, and devoured the lot. Reached the creek after dark.

Monday, June 13.—Found some rain-water on the banks of the creek, and, two of the horses requiring shoes, I stopped for the day. At noon sent Müller up the creek to see if he could find any water-holes, but he saw none. At 6 miles there is another creek joins this, coming from the south-west, this one coming more from the north-west. I am afraid I shall not have shoes enough to carry me into the settled districts. I shall follow the creek down, and see where it runs into; it does not seem to have been running for a number of years. The water has been 10 feet high. The breadth of the plain where the channels flow is a mile and a-half, and the quantity of water that flows down must be immense. It drains a very large extent of country. After examining the country during the next two or three days, I shall endeavour to follow it down and learn where it empties itself.

Tuesday, June 14.—Started 9 o'clock, bearing 135° . Running the creek down. At 8 miles crossed another branch of the creek coming from the south of west, of the same description as this one. A broad plain with many watercourses and heavily timbered with box-trees. We found no water. At 12 miles changed my bearing to south. At $3\frac{1}{2}$ miles camped at the two water-holes that Müller found when I sent him to examine the creek on the 9th instant. I could not with certainty say they are permanent. There are neither reeds nor rushes round them; they are very large and very deep, and when filled by rain must hold a large quantity of water for a very long time. There are ducks upon them. They might be supplied by springs from below. The water does not taste like rain-water, which leads me to think that it may be permanent.

Wednesday, June 15.—Started 9.15 A.M. on a course of 195° , following the creek down. As we approached Hanson Range, where it broke through, we came upon two nice water-holes with duck upon them. They are long, wide, and deep, with clay banks, and about 3 feet of water in the middle. There are no reeds nor rushes round them, and it is doubtful whether they are permanent or not. At $7\frac{1}{2}$ miles the creek winds a little more to the west; changed course to it 200° . At $1\frac{1}{2}$ mile we struck (in the gap) two very long and large water-holes—a quarter of a mile long, between 40 and 50 yards wide, and very deep. These I may safely say are permanent. After getting through the range, the creek spreads out over a large plain in numerous courses bearing towards the south-east. At $4\frac{1}{2}$ miles changed my course to 150° . 6 miles going more to the east changed again to 110° , and at 8 miles camped for the night without water. We have found no water since leaving the last water-holes. Although I do not doubt of there being more, it would have taken me too long a time to examine it more than I have done, my party being so small. We have passed several winter wurries of the natives, built with mud in the shape of a large beehive, with a small hole at the entrance. Numerous tracks all about the creek, but we see no natives—the creek still continuing spread out over the plain. We are now approaching the Spring Country again.

Thursday, June 16.—Started at a quarter past 11—still following the creek. Course, 113° . From the camp Mount Dalton bears 77° . The creek still continues to spread widely over the plain. At 5 miles I observed some white patches of ground on the south-west side of Mount Dalton, resembling a batch of springs. I changed the course to 65° , and steered for them, crossing the

Neale at 2½ miles. On the south-west side of the Neales the country is rather stony, and for about a mile from it the feed is not very good, in consequence of its being subject to inundation; but beyond that the feed is beautiful; large open plains, with some stones on the surface. At 3½ miles made the white place, and found it to be springs covering a large extent of country, but not so active as those formerly described. They would require to be opened, and then there would be abundance of water for all purposes. The water from those that have been opened and are running is beautiful. Leaving the springs, steered in a bearing of 117°. At 2 miles crossed the Neale at a place where it becomes narrower, and the channels much deeper, in which there are long sheets of salt and brackish water. I shall now leave the creek, as I see it is the same that I crossed on the 6th instant. In the time of a flood an immense body of water must come down it. At the widest part, where it spreads itself out in the plain, the drift stuff is from 14 to 15 feet up in the trees. Camped at 4 P.M.

Friday, June 17.—Discovered another large quantity of water, supplied by springs. This certainly is a wonderful place for them. There is an immense quantity of water running now.

Saturday, June 18.—Started early in the morning to examine the country. Found large quantities of quartz, samples of which I brought with me. Still well watered, but without any timber.

Sunday, June 19.—Still water in abundance, with large quantities of quartz. The course the quartz seems to take is from south-west to north-east. The place we examined to-day is a large basin, surrounded by the hills from Mount Younghusband and Mount Kingston, with the peaks running through the centre, and the quartz-spurs all trending towards the centre. To-morrow I shall have a look along the north-east side of Mount Kingston, for I see the quartz apparently goes through the range, and breaks out again on the north-east side, which is very white.

Monday, June 20.—Started at 8 A.M. to examine the quartz on the east side of Mount Kingston; course 348°; crossed the Peake, and, at 3 miles, struck a quartz-reef. The Freezing Springs still continued, but seem inclined to run more to the eastward. Changed my course to 34°, to a peak on a low range, which has a white appearance; at 8 miles reached the peak. The quartz ceases altogether, and the country stony from here. I can see the line of the Neale running eastward again, spread out over the plain. It was my intention to follow it until it reached the lake, but I find the ground too stony to allow me to do so. Having 300 miles to travel yet before reaching a station, and being reduced to my last set of shoes, and some of them pretty well worn, I am obliged to retreat. Changed my course to 135°; at 7 miles crossed the bed of the Peake, 3 miles broad, with a number of brackish water-holes, some very salt. At this point the trees scarce. I can see nothing of the lake. The country between the last point and this is good, salt-bush and grass, with stones on the surface. At 11 miles changed to 163°, and at 3 miles changed to 175°; 4½ miles camped on a gum-creek without water. The 163° course was over a very rotten brown plain, surrounded by low cliffs of gypsum, quite destitute of vegetation. It has evidently been the bed of a small lake at some time; There is no salt about it. On the last course the country again improved, and where we are now camped has become good.

Tuesday, June 21.—At 7:40 started in the same course as last night, 175°. At 1½ mile changed to 173°; at 1 mile myall and gum-creek; at 8 miles large gum-creek; at 9 miles changed to the hill, to where I had sent Müller, and where he found two springs. Instead of only two, they are numerous all around the hill. Some are without water on the surface, and others have plenty. It is a bed of springs. A little more east they are stronger, surrounded with green reeds and rushes.

Wednesday, June 22.—Started at twenty minutes to 9 o'clock; course 67°. At 3½ miles large hill of springs, covered with reeds and rushes; water running and good, with numerous other small ones all round. They are a continuation of those we camped at last night, with an abundant supply of excellent water. At 4 miles crossed the salt-creek, coming from Hawker's Springs; 8 miles crossed three salt and soda lagoons, surrounded by lime and gypsum mounds, in which are numerous springs up to the foot of the hills, and all round them. The hills I have named Parry Hills, after Samuel Parry, Esq. Distance 10½ miles. The springs are not quite so active; the lagoons are boggy. On my course we passed a large spring, with excellent water and plenty, and from the wet courses that I see coming from the mound I judge there is a plentiful supply. The country around is good, though stony. It was my intention to have gone to the east from this, but my horse's shoes will not admit of it. To the north, about 10 miles, there is another hill, which has the appearance of springs, and the salt-creek is running in that direction. To the south-east I observed other three conical hills, for which I will now steer, the bearing 156°. At 7 miles crossed a gum-creek, in which are large water-holes, where water had been lately, but now only mud. There might be water either up or down the creek, for there are numerous native-tracks leading both ways. At 10 miles crossed a large gum (stunted) creek, with springs. There is an abundance of water, but rather brackish; beds of rushes in the creek. At 19½ miles camped on a broad creek, spread over the plain, but no water. The country good.

Thursday, June 23.—The horses have strayed some distance. Started at 8-28 on the same course, 156°, for the conical hill. At 3 miles ascended it, and found it to be flat-topped. I can see nothing of any lake to the east; the view is interrupted by a flat-topped range; to the south-east the same. The country is stony, with plenty of grass and salt-bush. From this I changed my course to 182°, and at 3½ miles observed a peculiar-looking spot to the south-west, which has the appearance of springs. Changed my course for it to 245° and at 6 miles came upon a hill of springs, surrounded by a number of smaller ones, with an ample supply of first-rate water. The hill is covered with reeds and rushes: it is situated at the west side of a large plain, which lies low, and is bounded by stony table-land on the east, which has an abrupt descent of about 30 feet into the plain. On the west side are a number of broken hills, and a small range composed of gypsum and lime, having the surface covered with fragments of quartz, ironstone, and a number of other pebbles. On the hill where the springs are we have found lava. There are numerous small creeks coming from the hill, and running in every direction: they seem to be all in confusion. The plain is about 5 miles wide. These I have named the Louden Springs. Mount Margaret bears 290°, and Mount Stevenson 45° 80'.

Friday, June 24.—I must remain here to-day, and put the last of the shoes upon some of the horses, which are getting rather lame; I have been making them go without as long as I can.

Saturday, June 25.—Started in a bearing of 140°, at ten minutes to 8. At a quarter to 9, 3 miles, crossed a gum-creek; and at 12 o'clock, 11 miles, crossed the Douglas, but no water. The channel still broad and sandy; the country very good. At 10 miles, 4 o'clock, changed course (22 miles); changed to 108°, to a lagoon; 2 miles, changed to 140°; 5 miles, camped without water. The country travelled over to-day has been very good, although stony in some places. The lagoon is large, surrounded by table-land, in some places precipitous; the surface stony, with grass and salt-bush; underneath lime and gypsum. It being after sundown, I could see no springs. Camped without water. After unsaddling we observed a fire at some distance from us

to the south-west. I shall steer for it in the morning; there must be water there.

Sunday, June 26.—Started 8-25 A.M., on a bearing of 217° , to about where the fire appeared last night. Crossed the lagoon, which was rather boggy in some places. It is more than 2 miles broad, with a white crust on the top composed of soda and salt, but mostly salt. It must be supplied by springs. At 3 miles crossed a salt-creek with salt water; it empties itself into the lagoon, and is the same that passes by the Strangways Springs. I can see nothing of any springs at this part of the creek. Steered upon the same course to intersect my outward tracks. Saw some natives walking along a valley; they did not observe us. I hailed them, and an old man came up to us. He was rather frightened, and trembled a good deal. He seemed to wonder and be pleased at my smoking a pipe of tobacco. I gave one to him with a piece of tobacco, but he did not know how to manage the cutting, filling, and lighting operations. I did that also for him. In his final attempt he put the wrong end into his mouth, which he found to be rather warm, and quickly took it out. I then showed him the right end. He managed a whiff or two, but he did not fancy it. He seemed very much pleased with the pipe, which he kept. I then made him understand that I wanted water. He pointed the same course that I was steering. In a short time another one made his appearance in the distance. By a little persuasion from the old fellow he was induced to come up, and in a short time became very talkative, and very anxious to show us the water. In a few minutes a third one made his appearance, and came. He was the youngest; a stout, able-bodied fellow, about twenty-four years old. The others were much older, but were very powerful men; and all three in excellent condition. The women did not come up, but remained in the flat. I expected that they were about to take us to some springs, and was disappointed when they showed us some rain-water in a deep hole. They were quite surprised to see our horses drink it all. They would go no further with us, nor show us any more. In a short time after they left us, we struck our outward tracks, and steered for the Elizabeth Springs, where we arrived after dark.

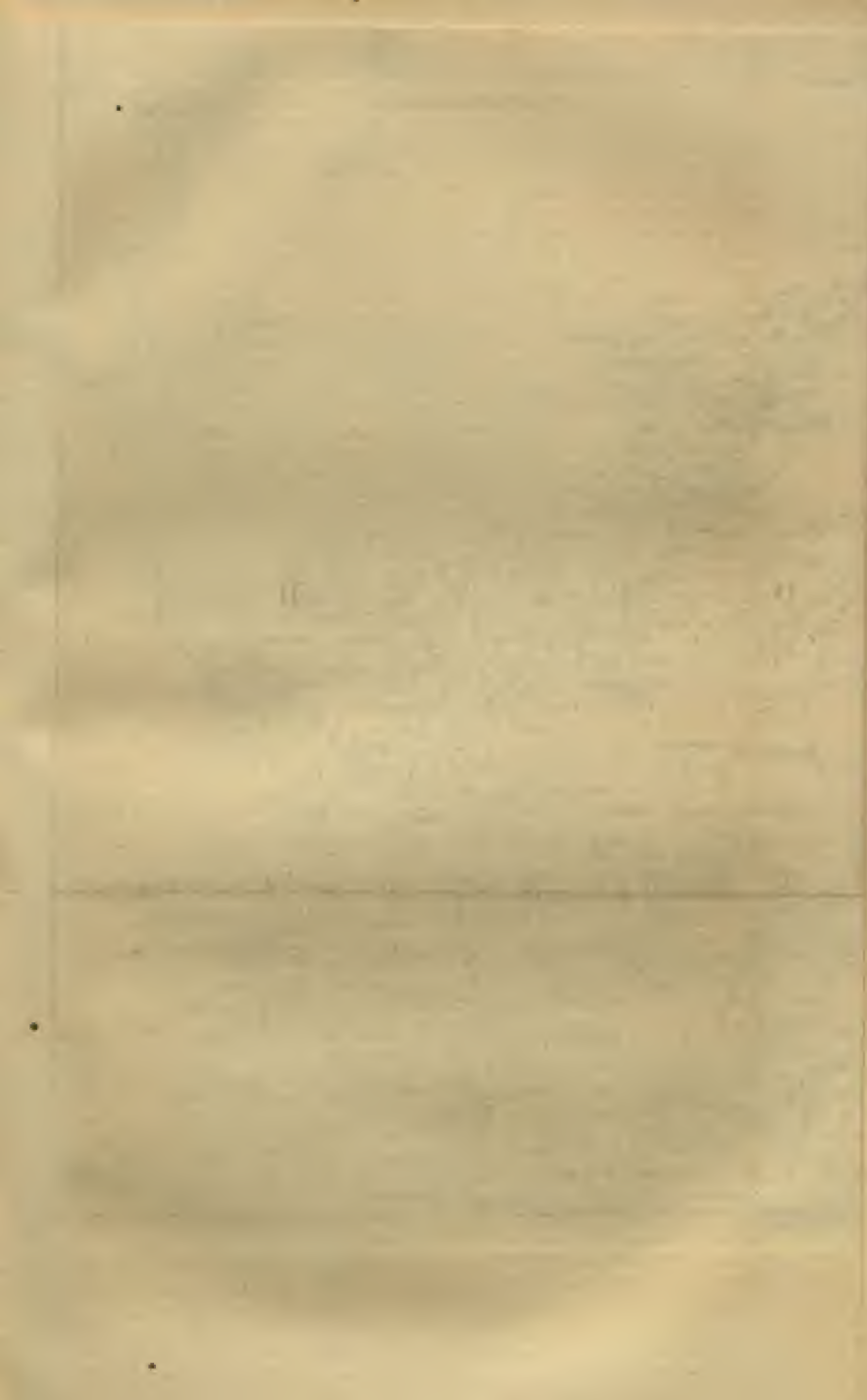
Monday, June 27.—Gave the horses a half-day's rest, and made Mount Hamilton Springs in the afternoon.

Tuesday, June 28.—Started for Chambers Creek to my first encampment. Arrived there in the afternoon. Distance 18 miles.

Wednesday, June 29.—Resting the horses and preparing for a trip down on the west side of Mount "North-West," to see if I can find a road and water that way.

Friday, July 1.—Started at 8 o'clock on a bearing of 120° . At 24 miles camped on a water-hole in Gregory Creek, where it comes out of the hills. There are three remarkable peaks north of the water; one in particular having a white face to the east, with a cover of black stones on the summit, distant about one mile. The first 5 miles was over a well-grassed country with stones on the surface, slightly undulating, with a number of good valleys running into the creek. The sand-hills then commenced with splendid feed upon them, varying in height from 10 to 30 feet high; broad, stony valleys between. They continue about 2 miles. Then they become very low, and the valleys very broad, and empty themselves into the Gregory Creek. At 22 miles crossed the main channel of the creek. It is divided into a number of courses, with some very deep holes in them. When they are filled, they must retain water for a length of time. There are numerous native encampments all about the creek. The gums are dwarf.

Saturday, July 2.—Started 10-8, course 120° . 3 miles, opposite a long, permanent water-hole, with rushes growing round it. 7 miles, crossed the





AUSTRALIA
Map to illustrate
Diaries of Exploration of
CENTRAL AUSTRALIA.
by
John Mc Douall Stuart Esq.
1860 & 1861.

0 20 40 60 80 100
Scale of English Miles

Stuart's Route

Tropic of Capricorn

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

Great Victoria Lake

upper part of the Gregory. $8\frac{1}{2}$ miles, top of dividing range. 13 miles, crossed a creek with rain-water. 14 miles, crossed another deep channel. Camped at 23 miles, within 12 miles of Termination Hill. The country for 10 miles before we halted was very good. On leaving Chambers Creek I crossed the range which divides the waters that empty North and South Lake Torrens, the range running nearly east and west.

Sunday, July 3.—Rounded Termination Hill, and arrived at Mr. Glenn's station. Having thus reached the settled districts, I have not thought it necessary to keep any further details of the progress of the journey. I have much pleasure in stating that Mr. Hergott, my botanist, and Mr. Louis Müller, my stockman, have afforded me in their several capacities all assistance in their power, and conducted themselves entirely to my satisfaction.

Adelaide.—Before I conclude I am anxious to record my grateful acknowledgments to my friends Messrs. Chambers and Mr. Finke, to whose kindness and assistance I was solely indebted for fitting out the expedition, and enabling me to fulfil my long-cherished desire to explore the interior of the province. I congratulate the colony on possessing such gentlemen of liberal minds and means; and should I, from my friends' kindness and liberality, be again entrusted as leader of the contemplated expedition to the north-west coast, I hope I shall be enabled, by the assistance of Divine Providence, to realise all their expectations, and confer the benefit on my fellow-men of opening up a line for rail and telegraphic communication with England.

VI.—*Journal of Australian Exploration.*—By MR. JOHN M'DOUGALL STUART, Gold Medallist, F.R.G.S.

Read, January 14, 1861.

Friday, Nov. 4, 1859.—Started from Chambers Creek for the Emerald Springs. At 10 miles crossed nine fresh horse-tracks going eastward; I suppose them to be those of his Excellency the Governor-in-Chief. I have not as yet seen his outward track. Arrived at the spring before sundown.

Saturday, Nov. 5.—Emerald Springs. Started at half-past seven o'clock on a course of 340° : at $7\frac{1}{2}$ miles changed to 38° . 3 miles to a high sand-hill, from which I could see two salt-lagoons, one to the south and one north; examined them, but could find no springs. Next bearing 18° , to clear the lagoon. $2\frac{1}{2}$ miles sandy, with salt-bush and grass; sand-hills broken and irregular. Changed to our first bearing, 340° . 6 miles, sand-hills not so broken, and crossing our line at right angles; same description of feed. Changed to a high hill, apparently stony, on 350° : at 5 miles reached the top and found it to be so; can see the lake lying to the north of us about 5 miles distant. The sand-hills have ceased, and ironstone taken their place. Changed to 315° to get a good view of the lake. $3\frac{1}{2}$ miles, looked all round for water, but could find none; camped without at sundown; had a good view of the lake. There is a large bay from the north-north-east to the north-north-west; there is nothing visible but the dark-blue line of the horizon. To the north-north-east there is an island very much resembling the shape of Boston Island, Port Lincoln. To the east of it there is a point of land coming from the main between island; and it is the same dark, deep-blue line. To the north-north-west are apparently two small islands. A short distance to the east of the horn of the bay there seems to be much white sand or salt for from 2 or 3 miles from the beach, towards the blue water (on this side of which there is a white line as if it were surf); this again appears at the shores of the island, and also at

the horn of the bay. From the south shore to the island the distance is great : I should say about 25 miles : it is very difficult to judge correctly.

Sunday, Nov. 6.—Lake. Got up before daybreak to obtain the first glimpse of the lake, to see if there is no land on the horizon, and, with a powerful telescope, can see none ; it has the same appearance as I have described last night. I watched it for some time after sunrise ; it still continued the same. After breakfast went to examine the shore, course north $2\frac{1}{2}$ miles ; found it to be caked with salt, ironstone, and lime-gravel. When flooded, at about 50 yards from the hard beach, the water will be about 3 feet deep. I tried to ride to the water, but found it too soft. I dismounted and tried it on foot : at about a quarter of a mile I came upon a number of small fish, all dried, and caked in salt ; they seem to have been left on the receding of the waters, or driven on shore by a heavy storm. They were lying about 12 yards broad in great quantities all along the shore ; there were very few of them perfect, especially the larger ones. I succeeded in obtaining three as nearly perfect as possible : one measured 8 by 3 inches, and one 6 by $2\frac{1}{2}$ inches, and another 5 by 2 ; they resemble the bream. This I should think a sufficient proof of the deepness of the water. I then proceeded on towards the water ; but it became so very soft, and the clay so tenacious, and my feet so heavy that it was with difficulty I could move them, and so was obliged to return. The salt is about 3 inches thick ; underneath is clay. I would have tried it in some other places, but my horses being without water, and as I will visit it again as I get to the north-west, I think it more prudent to search for water for them ; and if I can find none, to return to the camp. Started on southern course to examine country for springs. At 6 miles found that we were running parallel to sand-ridges and chance of water. Changed to 160° . Crossed a number of sand-ridges, but no water except a little rain-water that we found in a hole. Proceeded on to the camp, and arrived there at sundown.

Monday, Nov. 7.—Emerald Springs. Find that the weevil is at work with my dried beef ; must remain to-day and put it to rights. Preparing a package with the fish, &c., to be left for Mr. Barker when he comes here, to be sent to town. There are fish in this spring about 3 inches long : we have also found a cold-water spring among the warm ones.

Tuesday, Nov. 8.—Emerald Springs. Not being satisfied about one of the lagoons I saw yesterday, I have sent Kekwick and Müller to see if there are any springs, while I proceed with the others to the Beresford Springs ; they are to overtake me. Arrived at the springs at 3 o'clock p.m. ; our bearing 288° ; the country light sandy soil, with plenty of grass and salt-bush. We could find no fresh-water, but plenty of salt and brackish in the creek which we first struck at 6 miles from the Emerald Spring. Sundown ; no appearance of the two men ; they must have found something to have detained them so long : they had only 8 miles further to go than I had ; but I suppose they will be up during the night.

Wednesday, Nov. 9.—Beresford Springs. Sunrise : no appearance of the men ; they must have stopped at some water during the night ; how tiresome it is to be delayed in this way ! what can they be about ? At 12 o'clock they have arrived. They had passed my track, and gone on to Mount Hugh instead of coming here. I will give their horses an hour's rest, and go on to the Strangways Springs. The Paisley Ponds are dry ; but there is salt and brackish water 3 miles lower down the creek : course to the Strangways 315° . Started at 2 p.m., and at 5 p.m. arrived at the springs ; they are upon a high hill about 100 feet above the level of the plain ; there are a great number of them, and abundance of water, but very much impregnated with salt and soda. My eyes very bad. Distant from Beresford 10 miles.

Thursday, Nov. 10.—Strangways Springs. Suffering very much pain from bad eyes and from the effects of this water : cannot help it, but must go and

examine the country to north-west and west. Sent Müller to the east in search of springs, with instructions to examine my former track and all the country between. I started at 7 o'clock A.M., with one man, on a course of 315°. At 1 mile crossed a salt-creek with water. At 3 miles the sand-hills commence; they are long, and some of them rather high, with broad valleys between, crossing our course at right angles. At 2 P.M. struck a large salt-lagoon about 2 miles broad and 5 miles long, running north-east and south-west, narrowing at the ends; distance 14 miles: tried to cross it, but found it too boggy; rounded it on the south-west point, and there discovered a spring: no surface-water, but very soft, and the same all round for about 2 acres square, covered with green reeds of a very dark colour and very thick, showing the presence of water underneath. Proceeded round the lagoon to a hill which has the appearance of reeds on top of it. After a good deal of bogging in crossing the bends of the lagoon, we arrived there, and found it to be a very remarkable hill: the dark-green appearance is caused by reeds, rushes, and water-grass. The hill is upwards of 100 feet high; the lower part red sand; a little higher up is a course of limestone; on the top is a black soil, sand and clay-soil, through and over which the water is trickling, and then filtering through the sand into the lagoon: where the water is on the top of the hill is upwards of 100 feet long. There are immense numbers of tracks of emus and wild-dogs, also some natives', all fresh. On the north-west side there is one solitary gum-tree. About half a mile in the same direction is another bed of reeds, and a spring with water in it. All the banks round the lagoon are of a springy nature. I am very glad I have found this; it will be another day's stage with water nearer to the Springs of Hope: we can now make that in one day if we can get an early start. By the discovery of springs on this trip the road can now be travelled to the farthest water that I saw on my last trip from Adelaide, and not be a night without water for the horses. The country to the south and south-east of the last spring, which I have named the William Springs after the youngest son of John Chambers, Esq., is sand-hills and valleys rich in grass and other food for cattle. Thence I proceeded to hill bearing 160° south of west, distant 3 miles, from the top of which I could see no rising ground to the westward—nothing but sand-hills. Changed my course south to a white place under some stony hills: at 10 miles reached it, and found it to be a salt-creek, but no springs. The last 10 miles was through sand-hills, not so high as those I crossed on my way out, but more broken, with plenty of feed. It is my intention to push to the camp at Strangways Springs to-night, so as to get an early start in the morning. Arrived at 10 P.M.; found that one of the horses had not been seen all day: something always does go wrong when I am away; I shall require to make a search for him in the morning. My eyes very bad, very: the effect of the glare of the sun on the sand-hill, and the heat reflected back from them, and that everlasting torment the flies.

Friday, Nov. 11—Strangways Springs. My eyes so bad I cannot see; unable to go myself in search of the missing mare; despatched two of the men at daybreak to circuit the spring, and cut her tracks if she has left them: they have returned; can see no tracks leaving the spring; she must be concealed among the reeds: sent three men to examine them; mare found at 1 o'clock. Started at 2 P.M., and arrived at William Springs at sundown, distant 14 miles. By keeping a little more to the east the sand-hills can nearly be avoided, and a good road over stony country, with good feed, can be had to this spring.

Saturday, Nov. 12.—William Springs. Very unwell; unable to move today; almost blind, and ill from the effects of the water at Strangways Springs. Wishing also to examine round this spring, I will remain here today; and, as I cannot go myself, will send two of the men in different directions. At sundown they returned, and reported that there are no springs for

10 miles round distant from east-south-east to north. To the east, about 3 miles, there is another lagoon resembling this, but not so large, and no springs; plenty of grass all round. About a mile distant from the lagoon saw two natives, but could not get near.

Sunday, Nov. 13.—William Springs. Feel a little better to-day, but suffer very much from the eyes. I hope I shall be able to travel to-morrow, for it is misery to remain in camp in the hot weather; lat. $28^{\circ} 57' 24''$; variation, $4^{\circ} 47' E$.

Monday, Nov. 14.—William Springs. Started on a course of 317° for the Hope Springs, and arrived at 5 P.M. I kept to the west in order to see what the country was in that direction, in the hope of finding some more springs. At 21 miles crossed the Douglas coming from west-north-west; the country from it to the north-west and north shows signs of being auriferous: it is the commencement of it; the country begins to look quite white with the quartz. From the Douglas to north-west the feed is not quite so plentiful—salt-bush with grass, the salt-bush predominating; but as we approach the Spring of Hope it is improving, and becomes good as we approach the creek; 30 miles.

Tuesday, Nov. 15.—Spring of Hope. The spring is still good, yielding a plentiful supply of water. Sent one of the men to the east and south-east to examine some white patches of country that I saw on our journey up here, while I and one man, with two days' provisions, started south-west to a high and prominent hill in the range. At 11 A.M. arrived at the top, from which I had a good view of the country all round: it is a table-topped hill standing on high table-land, which is intersected with numerous small watercourses, flowing towards the Douglas, on the south and west sides of the mount, which I have named Mount Anna. It is a compound of ironstone, quartz, granite, and a chalky substance; also an immense quantity of conglomerate quartz and ironstone, which has the appearance of having been run together on a smelting-work. There are also numerous courses of slate of different descriptions and colours. The quartz predominates, and gives the country the appearance of numerous springs: these patches have deceived me two or three times to-day. At 20 miles the sand-hills begin again: the country rather poor, with a number of isolated hills; also a number of white chalky cliffs of 20 feet high and upwards. No water, nor appearance of any to the west for a considerable distance. Changed to north-west to look at some more white country, but again disappointed; it turns out to be quartz with low chalky cliffs, and a large quantity of igneous stone. Country the same, very stony, with salt-bush and a little grass in places. I can see no inducement for me to go further. I shall therefore return to the camp. Arrived after dark; my eyes still very bad, and I suffer dreadfully from them. To-day has been hot, and the reflection from the white quartz and heated stones made it almost insufferable; and what a relief when the sun went down!

Wednesday, Nov. 16.—Spring of Hope. Still very ill. Unable to go out myself, sent Müller to examine the creek nearer Mount Margaret for water. If he finds water near the mount, I shall move there, as it will be nearer to build the cone of stones on the top of the mount than at Hawker Springs. Shoeing horses, and building a small cone of stone on a reef of rocks that runs along the top of a hill west-north-west from the spring about half a mile, which will be a very good mark for finding it. Müller has returned, and reports having found water in the other creek about 5 miles north-north-west from this. The water is in the centre of the creek, three or four holes; some are brackish, but one large one is very good. A number of natives camped about it, but took to flight the moment they saw him. He tried to induce them to come near him, but they would not; they appeared to be very much frightened, and climbed up the cliffs to get out of his way. Plenty of feed between the two waters: through the hills there is an abundance. I find the

water discovered to-day, which I have named the George, after G. Davenport, Esq., will be of no advantage to me in building a cone of stones; I will therefore move to the Hawker Springs to-morrow.

Thursday, November 17.—Spring of Hope. Arrived at the Hawker Springs at noon; commenced the survey, springs still good; commenced and built a cone of stones on the hill at the westernmost spring; some of them at this point will require to be opened. We have opened one and the water is beautiful; immense quantities of reeds and rushes.

Friday, November 18.—Hawker Springs. Building cone of stones on top of Mount Margaret, and making other preparations for the survey. To-day very hot; wind, south-east; a great deal of lightning to south; obtained bearings from hill, viz., Mount Margaret, $223^{\circ} 30'$; Mount Younghusland, $327^{\circ} 30'$; hill at Parry Springs, 55° ; Mount Charles, 43° ; Mount Stevenson, $106^{\circ} 30'$.

Saturday, November 19.—Hawker Springs. Sent the party on to Fanny Springs, where I intend to lay down my base-line. Went with Kekwick to the top of Mount Margaret, and obtained the following bearings:—Mount Anna, 188° ; Spring of Hope, 182° ; Mount Younghusland, 343° . This hill is composed of grey and red granite, quartz, and ironstone; on the lower hill is a blue and brown strata. I then proceeded to examine the creeks running to the east; in following one of them down from the hill we came upon another good spring of water, running, and very good; the creek is bounded on both sides by nearly perpendicular cliffs for about a mile, which appear to get much lower and broken to the west; it is situated about one mile north of Mount Margaret, and runs into the Hawker Springs Valley; could see no more higher up. Followed the creek down to opening, proceeded about $\frac{1}{2}$ mile, entered another gorge and rode up it about $\frac{1}{4}$ mile; came upon another spring running also, water excellent; numerous natives' camps in the creek; country the same as in other creek, cliffs slate and not so high and more broken, with watercourses between them, through which cattle could find their way to the tops of the hills, where there appears to be plenty of grass; there is also an abundance at the mouth of the gorge and on the plains; this runs also into the valley of the Hawker; distant from Mount Margaret $2\frac{1}{2}$ miles 8° east of north. It is getting towards sunset and I must make off to the camp, which is distant about 12 miles; arrived after dark; springs still as good as when I first saw them; very tired, have had a very long day of it.

Sunday, November 20.—Fanny Springs. Got up at daybreak, went to top of Mount Charles, on which I had ordered the men to build a cone of stones after their arrival here yesterday, and obtained the following bearings, viz.,—Springs north of Hawker's, 235° ; Hawker Springs, $223^{\circ} 30'$; Mount Margaret, $222^{\circ} 50'$; Mount Stevenson, $125^{\circ} 50'$; hill at Parry Springs, $63^{\circ} 45'$; Mount Younghusland, $308^{\circ} 45'$; Black Hill, 34° ; base-line, 311° . On my return to the camp the men informed me that Smith had absconded during the night; he generally made a practice of sleeping some little distance from the others when I did not see him lie down, I had checked him for it several times; it does not appear that he had gone to sleep, but waited an opportunity to steal away, taking with him the mare with harness, &c., which he used to ride, also some provisions. As I had started very early to walk to Mount Charles, his absence was not observed until some time after I had left, and being detained some hours on the top of the hill in consequence of the atmosphere being so thick that I could not obtain my observations, it was 7 A.M. before I heard of his departure. That moment I sent Kekwick for my own horse (he being the swiftest) ordered him to be saddled: he to mount, pursue, overtake, and bring Smith back; but during the time he was preparing I had time to think the matter over, and decided upon not following him, as it would only knock up my horses and detain me three or four days. Smith must have started

about midnight, for I was up taking observations from 12½ A.M. until day-break; neither saw nor heard anyone moving during that time. I could ill afford to lose the time in pursuing him, situated as I now am in the midst of my survey; and he being a lazy, insolent, good-for-nothing man, and, worse than all, an incorrigible liar, I could place no dependence upon him. We are better without such a character; he has been a very great annoyance and trouble to me from the beginning throughout the journey: what could have caused him to take such a step I am at a loss to imagine; he has had no cause to complain of bad treatment or anything of that description. He never mentioned such a thing to the other men, nor was he heard to complain of anything. Such conduct on an expedition like ours deserves the most severe punishment; there is no knowing what fatal consequences may follow such a cowardly action. Had he not stolen the mare I should not care about his running away, but I am short of riding-horses and have a great deal for them to do during the time I am surveying and examining the country. He went off just as the heavy work was beginning, and it was principally for that work I engaged him. He put on a pair of new boots, leaving those he had been wearing, evidently intending to push the mare as far as she would go, expecting he would be pursued, then leave her and walk the rest. I expect when he reaches the settled districts he will tell some abominable lie about the matter; if such conduct is not severely dealt with, no confidence can be placed in any man engaged in future expeditions.

Monday, November 21.—Fanny Springs. Kekwick and I commenced chaining the base-line from the top of Mount Charles, bearing 131°; distance chained, 4 miles 30 chains. I ordered H. Strong to come to me with two horses, which he did about 1½ P.M.; we had finished the line and were waiting for him, for I had seen some country that looked very much like springs, north-east, a mile or so from the line. Went to examine it and found it to be splendid springs; one in particular is a very large fountain, about 20 yards in diameter, quite circular, apparently very deep, from which there is running a large stream of water of the very finest description; it is one of the largest and finest reservoirs I have yet seen; three times the size of the one at the Hamilton Springs, with abundance of water for any amount of cattle; the water is running a mile below it.

Tuesday, November 22.—Fanny Springs. Engaged chaining base-line to north-west; saw some more springs a mile or two to the east; too tired to examine them to-day; it is dreadfully hot; returned to the camp at sundown.

Wednesday, November 23.—Fanny Springs. Finishing the remaining part of base-line and plotting. The line is 10 miles 40 chains long, crossing the top of Mount Charles. The bearings from the south-east are:—Hill at Parry Springs, 37°; another hill at same place, 35° 30'; Mount Younghusband, 309°; Mount Margaret, 240° 15'; Mount Stevenson, 124° 30'. From the top of Mount Charles:—Hawker Springs, 223° 30'; Mount Margaret, 222° 50'; Mount Stevenson, 125° 50'; hill at Parry Springs, 63° 45'; another ditto, 60° 30'; Mount Younghusband, 308° 45'. From north-west end:—Mount Younghusband, 307°; Mount Margaret, 198° 15'; hill at Parry's Springs, 89°; another ditto, 85° 30'; bearing of base-line, 311°.

Thursday, November 24.—Fanny Springs. Fixing the angles of runs; found another batch of springs close to the north-west boundary of large run, covering 4 or 5 acres of ground, with an immense quantity of reeds; they are not so active as the others; the ground round about is very soft, and where I tasted the water it is most excellent; the country round is of the same kind as that already described. After fixing the north-east corner I proceeded to examine the country beyond the boundaries of the runs in search of springs. After having gone several miles north, I saw the appearance of a lagoon north-east, for which I started. Arrived there, but could find no springs round it;

still continued on the same course for a considerable distance further to a high sand-hill, from which we could see the Neale winding through a broad valley. One part of the creek being much greener than the rest I went to examine it; found the green appearance of it to be caused by fresh gum-trees, young saplings, rushes, and other fresh-water plants and bushes. The creek spreads over the plain in numerous channels, 4 miles wide, but the main channel has only gum-trees with a chain of water-holes, some salt, some brackish. By scratching on the bank where the rushes were growing got some beautiful water in the gravel only a few inches below the surface: there is plenty of feed, and the wild currant, or rather grape, grows in great abundance, and is very superior to any I have tasted before. There are two kinds: one grows upon a dark green bush, which has a tart and saltish taste; the other grows upon a bush of a much lighter colour, the fruit round and plump and much superior to the other, and in taste much resembling some species of dark grape, only a little more acid. It is a salsolaceous bush, and loaded with fruit. From this I went in a north-east direction to a hill I had seen on my former journey, and found it to be hot-springs, with a large stream of warm water flowing from them nearly as large as the Emerald Springs, and seemingly warmer. This is a very hot day, and I have been riding fast: it is as much as I can bear to keep my hand in it for a few minutes 6 inches below the surface. I put in a staff about 4 feet long, but could find no bottom, nothing but very soft mud; the staff came up quite hot. It is a very remarkable hill; from the west side it would be taken for a very high sand-hill with scrub growing on it, in fact it is so. The springs are not seen until the top is reached; from it all the east side is covered with reeds to the base of the hill; the hot-springs are near the top, and cold ones on one side to the south, some at the bottom and some half-way up. There is a large lagoon to the east, which I will examine when I move the party up to this, for I have not time to-day. Returned towards the camp and fixed the north-west corner of the second run. I am obliged to drive pickets into the ground to show them. I would have built cones of stones, but could get none large enough to do it with. Arrived at the camp very late, 14 hours on horseback.

Friday, November 25.—Fanny Springs. Started shortly after sunrise to mark the other two corners of the two runs; on approaching south-west angle of the second run (Parry Springs run) I discovered three other springs, close to the boundary of first run; two of them are outside and one inside, or rather on the boundary; it is a large spring, having seven streams of water coming from it, one large, the other smaller. The other two have abundance of water covered with reeds. Proceeded and marked the other corners; in the same fix, no stone; obliged to put down pickets. Returned to camp, keeping outside south boundary in search of springs, but found none. Crossed over table-land, salt-bush, and grass, with stones on the surface; arrived at the camp a little before sundown.

Saturday, November 26.—Fanny Springs. Started for Parry Springs in the evening, commenced putting up a cone of stones on the northernmost hill. The day oppressively hot; one great thing here is that the nights are very cool, we are obliged to have a good fire on all night; we have had one or two warm nights since I have been out this time, I suppose the reason must be that a large body of water exists in the lake not far distant from us, the wind coming from the north-east. From north-west to south-south-east the winds are generally cool; it is so cold in the morning that the men are wearing their top coats; the day does not get hot till the sun is a considerable height.

Sunday, November 27.—Parry Springs. Cold winds this morning, blowing from the east; in the afternoon the sky became overcast, coming from south-west.

Monday, November 28.—Parry Springs. Building a cone of stones upon

the northernmost of the hills, fixing the south-east corner of run No. 2, and moving to the hot-springs; arrived at sundown. The country between Parry Springs is not so good, except on and close to the Neale, especially on the north side of the creek, which is a loose soil washed from the cliff, nearly destitute of vegetation for about a mile from the cliffs, which are not more than 40 or 50 feet high. In the creek there is plenty of water, but it is brackish, almost salt; there are plenty of gum-trees, young and old, but not very large, with numerous other water-shrubs. The banks, in places, are covered with rushes; also another channel to the east, in which we saw a number of holes where the natives had been digging for water; cleaned out one, and found water at 2 feet from the surface above the water in the creek; it is very good. On examining this spring I find there is a great deal more water coming from it than from the Emerald; the hot-springs are on the top of the sand-hill, and the cold ones at the foot. There are large quantities of the wild grape growing here, both red and white; they are very good indeed, and if cultivated would, I think, make a very nice fruit.

Tuesday, November 29.—Primrose Springs. Surveying run, and sent Müller to the north to a distant range, and Strong to north-east to look for springs: towards evening both returned without being successful; they passed over plenty of good feeding-country, but the range is high and stony, with very little grass, only salt-bush; it is a continuation of Hanson Range, all table-land.

Wednesday, November 30.—Primrose Springs. Surveying, &c., north-east corner of run. No. 2 is about 2 miles west of the Neale. I scratched a few inches deep from the surface in the gravel, and found very good water. The wild grape is in abundance here, and grows as large as the cultivated one. I have obtained some choice seeds.

Thursday, December 1.—Primrose Springs. At daybreak started with Kekwick to find the lake on an easterly course, keeping a little to south of east to avoid a soft lagoon. Travelled over a fair salt-bush and grass country, with stones on the surface. In places the grass is abundant, though dry. At 7 miles the sand-hills commenced. They are not high, with broad valleys between, covered with stones. On the sand-hills there is plenty of grass, numerous native and emu tracks going towards the Neale which is 14 miles south of us. Struck a gum-creek with salt-water. Searched for springs, but could find no fresh ones. Continued on a course east, over sand-hills and stony plains; and at 20 miles crossed the Neale. It is very broad, with numerous channels. In the main one there is plenty of water, but very brackish. We scratched a hole on the bank of one of the holes, about 2 feet from the salt-water, and found plenty of good water at 6 inches from the surface, of which our horses drank very readily. This seems to be the mode by which the natives obtain good water in a dry season like this. The emus and other birds also adopt the same plan. An immense quantity of water comes down this creek at times. The drift stuff is upwards of 13 feet high in the gum-trees. A number of native-tracks all about the creek, quite fresh, but can see none. After giving our horses as much water as they would drink, we crossed the creek, which now runs north, and proceeded still on our east course over stony plains for 4 miles, then over sand-hills which continue to the lake, which we struck at 35 miles. The atmosphere is so thick, it is impossible to say what it is like to-night. Searched about for water, but could find none. Camped without, under a high sand-hill, so that I may have a good view in the morning. I like not the appearance of it to-night; am afraid we are going to lose it.

Friday, December 2.—Lake Torrens. Got up at the first peep of day, and ascended the sand-hill. I fear my conjecture of last night is too true; can see a small, dark line of low land all round the horizon: the line of blue water is very small. So ends Lake Torrens. Started on a course of 30° west of north,

to where the Neale empties itself into the lake; at 7 miles struck it; found plenty of water, but very salt: pelicans and other water-birds upon it. Traversed the creek to south-west in search of water for the horses. At 5 miles came upon a number of water-bushes growing on the banks of a large brackish water-hole. Scraped a hole about 2 feet from the bad water, and got good water 6 inches from the surface for ourselves and horses. Gave them an hour's rest, and started on a west course for the camp, where we arrived at $\frac{1}{2}$ past 9 p.m. The country similar to our outward route. Feed more abundant. At sundown we crossed the broad channel of a creek, with moisture in the centre. Having neither time nor light to examine it to-night, must do so to-morrow, as I think there must be springs to supply the moisture.

Saturday, December 3.—Primrose Springs. Sent Kekwick to examine the creek we crossed last night. I cannot go: my eyes are so bad, I can scarcely see anything. This is the first time I have had such a long continuation of them. I am trying every remedy I can imagine, but each seems to have very little or no effect. At sundown Kekwick has returned, and reports having found springs which supply the creek; but they are saltier than the sea, or the strongest brine that ever was made. He has brought in a sample of crystal of salt which he got from under the water, attached to the branch of a tree which had blown down into it. The creek is the upper part of the Gum-creek, the first crossed yesterday; and flows into the Neale, which accounts for the water being so salt at the mouth of it. No fresh-water springs to be seen round about.

Sunday, December 4.—Primrose Springs. Examining the Neale for fresh-water in springs. The water-holes are abundant, but all more or less brackish. Plenty of rushes on the banks, where fresh water can be had by scratching a little below the surface. I have not the least doubt but there will be plenty of fresh water on the surface for a long time after the creek comes down and sweeps all the soda and salt into the lake. The rapid evaporation causes it to be so brackish, and I should think the consumption by stock would make a great improvement in it; there would not be so much of it exposed to the sun, and the evaporation would be much less. After considering the matter of having seen the northern boundary of Lake Torrens, I am inclined to think I have been in error. What I have taken for the lake may have been a large lagoon which receives the waters of the Neale before going into the large lake. I have seen such a feature as that before: I must examine it again. After my surveys are completed, I shall move my party down the creek to where we found the good water, and from there see what it really is. I cannot bring my mind to think this is the north boundary of it.

Monday, December 5.—Primrose Springs. Moved the party down to the Parry Springs. On the road we saw some more springs, on the south side of the lagoon that surrounds the hill. The water is very good, with a plentiful supply. They came within the boundary of the run. These springs I have already described. I should have examined Loudon Springs to-day, but wished to examine the country between this and them. It will take me a whole day to do so. Eyes very bad.

Tuesday, December 6.—South Parry Springs. Shortly after daybreak started for Loudon Springs, taking different courses through in search of more springs, but can find none. Examined the George Creek, where the small run is to be laid off. Found some good water by scratching in the creek, where there are plenty of rushes. At a little before sundown arrived at the springs. What I did not observe before is, that the higher springs on the top of the hill are warm, but not nearly so hot as the others. The lower ones are cold. Some other party has been here. We have seen their fresh tracks and the place where they camped. They seem to have been wandering about a good deal before they found it.

Wednesday, December 7.—Louden Springs. Went to top of Mount Stevenson. Built a cone of stones, and obtained bearings to fix it. No appearance of any springs to the east of this, nor of the lake.

Thursday, December 8.—Louden Springs. Surveying and building trigonometrical station on a light-coloured hill to the south of this. Eyes very bad; can scarcely see to do anything.

Friday, December 9.—Louden Springs. Nearly blind; dreadful pain; can do nothing to-day; no sleep last night with them.

Saturday, December 10.—Louden Springs. All yesterday the wind was hot and strong from west and north-west; heavy clouds from south and south-west: in the evening the wind changed to south. This morning still the same heavy clouds from same direction. Eyes a little better: shall be able to do something. The sky being overcast, shall put up some of the corners of this run. Surveying run. Saw no more springs to-day. Around the springs the country is not very good for feed, but at a mile or so it is very good. It is a country that will improve very much after it is stocked.

Sunday, December 11.—Louden Springs. Still cloudy, but no rain.

Monday, December 12.—Louden Springs. Still very cloudy; wind south; heavy clouds to north-west, but no rain. Finishing the east boundary of No. 3 run. Can find no more springs in or about this run. At sundown very cloudy, but no rain.

Tuesday, December 13.—Louden Springs. Started at sunrise to find the lake on an east course. The horses being a long distance off, it was late before they came up. At 9 miles crossed the Gum-creek, running north, spread out in a broad valley into numerous courses rich in food for cattle. At 12 miles sand-hills commenced, and continued to the shores of the lake, with broad, stony plains between, with plenty of grass. At 20 miles crossed the Douglas, running north through sand-hills, in a broad valley, divided into numerous courses. Dwarf gum-trees, mally, tea-tree, and numerous other bushes. The bed sandy, and no water. At 35 miles struck the lake where the Douglas joins it. The country travelled over to-day has been stony plains (undulating), low sand-hills, with abundance of feed, but no water. There is some water at the mouth of the Douglas, but it is saltier than the sea. The water in the lake seems to be a long distance off, and the mirage so very strong, that I can form no opinion of it to-night. This seems also a bay I have got into. There is a point of land to the south bearing 25° east of south, and the other bearing 25° east of north. Searched about for water, but could find none. Camped in the creek without any. The country at this part is very low, nearly on a level with the lake. The only sand-hill I shall be able to get a view from not above 30 feet high. At sundown I got on top of sand-hill, but could see nothing distinctly: must wait until morning. This creek appears to be little frequented by natives. Can see very few tracks, and no wurlies.

Tuesday, December 14.—Lake Torrens. At the first dawn of day got to the top of the hill, and remained there some time after sunrise. To south-east there is the appearance of a point of land, which I suppose to be the island which I saw when I first struck the lake. There is the appearance of water between. A little more to the eastward I can see nothing but horizon. To the east there is again the appearance of very low, distant land—a mere dark line seen through a powerful telescope. To the north of that there is nothing visible but the horizon, but blue and white streak between. To the N.N.E., beyond the point, a little low land is visible running out from the point, with water to the far distance. Rode down to the beach to see what that was composed of; found it to be sand and gravel; firm ground next the shore. Tried a little distance with the horses, but found it too soft to proceed. Then I dismounted, and tried it on foot; but could only get about

3 miles: it became so soft, that I was sinking to the ankles; and the clay so very tenacious that it completely tired me before I got back to the horses. The quantity of salt was not so great here as at the first place I examined. What I thought was a point of land bearing N.N.E. turns out to be an island, which I can see from here. The point of the bay is to the north from where I took the bearings. Between the point and the island I can see nothing but horizon; too low to see any water. Searched the creek up for 7 miles in search of water and springs, but could see none, nor any indications. Had breakfast, and started on a course of 26° north of west in search of water or springs. Crossed the Davenport, and ascended a low range, but could see no indications. The country similar to that passed over yesterday. On my outward course changed my bearings towards the camp, and arrived there a little before sundown. Horses very thirsty, and drank an awful quantity of water; but, it being hot, will do them no harm. It is remarkable that to the east of the hot-springs I can find no others. This is the third time I have tried it, and been unsuccessful. I am almost afraid that the next time I try the lake I shall not find the north boundary of it. Where can all this water drain to? it is a mystery.

Thursday, December 15.—Louden Springs. Surveying run No. 4, and sent Kekwick to correct observations from Mount Stevenson.

Friday, December 16.—Louden Springs. Finishing No. 4 run. To-day we have discovered a large fresh-water hole in a creek joining the George and coming from the south-west; the water seems to be permanent. It is half a mile long, and seems deep; on the banks a number of natives have been encamped; round about their fires were a large number of fresh-water mussel-shells, the fish from which they had been eating, which I should think a very good proof of the water being permanent. After finishing the survey, I followed the creek up for a number of miles in search of more water, but could find none; it spread into a number of courses over a large plain, on which there is splendid feed.

Saturday, December 17.—Louden Springs. Started for the springs under Mount Margaret, to finish western boundary of No. 1 run. Arrived towards sundown; found the creek occupied by natives, who, as soon as they caught sight of us, bolted to the hill, and got upon the top of a high cliff, and there remained some time, having a good view of us. I did everything in my power to induce them to come down, but they would not, and beckoned us to be off back the road we came. At night they had fires round us, but at some distance off.

Sunday, December 18.—Mount Margaret. About 9 o'clock A.M., the natives made their appearance on the hill, and made signs for us to be off: they were eight in number. I find that we have camped close to a large quantity of acacia-seed, that they had been preparing when we arrived, but had no time to carry away before we were on them. One old fellow was very talkative, and I went towards them to try and make friends with them, but they all took to the hills; by signs I induced the old fellow to stop, and in a short time got him to come a little nearer. When I came to the steep bank of the creek he made signs to me to come no further. I showed him I had no arms with me, and wished him to come up. I could understand him so far that he wished us to go away, that they might get their seeds. I thought it as well not to aggravate them, but to show them that we came as friends; and as I had completed all I had to do here, I moved the camp towards the Freeling Springs, at which they seemed very glad, and made signs for us to come back at sundown. They seem to be a larger race than those down below: the men are tall and muscular, the females are low in stature, and thin. I examined the Mount Margaret range in going along. There are a number of gum-creeks

coming from the north side, which flow into the Neale. We searched them up and down, but could find no water. The number of channels that join them in the range is so great that it will take weeks to examine them minutely for water; we camped in one of them without water, although the country shows well for it.

Monday, December 19.—Gum-creek. Started on north-west course to examine the country between this and the Mount Younghusband range. We could see no springs until we reached the Blyth, in which there is water, but a little brackish, that will do well for cattle. Rode through the middle of the range, and came upon some horse-tracks, not very old: saw where the party had encamped, and a cairn of stones they had raised on the top of the hill; followed their tracks some distance down the gully; they seem to be going to the Burrow Springs. They appear to have gone back again. Left the tracks, and proceeded to the Freeling Springs; arrived there in the afternoon. No one has been here since I was, as far as I can see. The country we passed over yesterday and to-day has been really splendid for feed. The springs continue the same, running in a strong stream. Feed plentiful, water abundant, and of the finest quality.

Tuesday, December 20.—Freeling Springs. Sent Kekwick and one of the men to examine the gold-field, and to select a place for sinking to-morrow morning. My eyes being so bad, I am unable to go. This afternoon they have returned, bringing with them samples from the quartz-reefs, in which there is the appearance of gold. Kekwick said he has not seen such good quartz since he left the diggings in Victoria. There is every indication of gold: I will give it a good trial before leaving it.

Wednesday, December 21.—Freeling Springs. Commenced diggings; put down hole, but found the rock too near the surface. Very slight indication. We found another place which seemed to promise better. Began sinking there, and at 4 feet came upon some large boulders, round which is very good-looking stuff for washing. Took some of it to camp and washed it. No gold, but good indications; a quantity of black sand and emery, also other good signs. Shall continue the hole, and see what is in the bottom. Thunder-shower this afternoon; south-west hot wind.

Thursday, December 22.—Sinking: made little progress, in consequence of stone being so large, and from want of proper tools, crowbars, &c.; washed some more stuff from round about the boulders; the produce same as yesterday; no gold.

Friday, December 23.—Freeling Springs. Found that we could do nothing with the stones with the tools we have. Examined the country round about, and found another place, which will be commenced to-morrow. Examined a quartz-reef, which has every indication of gold. I regret that I have not another man, so that I might be able to examine the country for some distance round; it requires two at the camp, and, no water being within two miles of where we are sinking, it would not be safe to leave the camp with only one man, and two digging, which is all our strength. Heavy thunder-storm from the south-west, but very little rain; blew my tent in two. At sundown it passed all over and cleared up, which I regretted to see, as I expected heavy rains at this season, to enable me to start for the north or north-west.

Saturday, December 24.—Sank upwards of 6 feet through gravel, shingles, stones, and quartz. Wind south-west; heavy clouds; wind hot.

Sunday, December 25.—Wind south; heavy clouds, but no rain. Towards evening changed to south-east; cool; shortly after the clouds disappeared.

Monday, December 26.—Got to the bottom of the hole; washed the stuff, but no gold. Commenced another hole by the side of the quartz-reef, which

looks well. In the morning the wind was from the north; at 10 A.M. it suddenly changed to south, and blew a perfect hurricane during the whole day, with heavy clouds; but no rain has fallen.

Tuesday, December 27.—The storm continued during the night, until about 3 o'clock this morning, when a few drops of rain fell, not enough to be of any service to me. Sinking alongside the quartz-reef, bottomed the hole; no gold, and I am afraid we shall not be able to sink any more; our tools are getting worn out. During the rest of the day examined the quartz-reefs, in which there is every appearance of gold; shall stop the search for it, and proceed to the north-east to-morrow, for I think some rain has fallen in that direction, which will enable me to examine the country and see if the lake still continues.

Wednesday, December 28.—At 7 A.M. started with Kekwick on a north-east course. At 13 miles crossed the Neale, spread over a large grassy plain 4 miles broad. The country to this is a little stony, with plenty of good feed. The Peake runs nearly the same course for about 4 miles, then runs east for some little distance, and turns to south-east and joins the Neale. Crossed the Neale, and ascended a low ridge of table-topped hills, stony, with salt-bush and grass. At 20 miles crossed another creek, with myall and stunted gum, running over a plain in numerous courses. Plenty of grass, but no water. After crossing it ascended a high peak, which I supposed to be the top of the Hanson range, but found another long table-topped hill, higher, about 3 miles distant; ascended that, but could see nothing but more table-topped ranges in the distance. This hill is 35 miles from Freezing Springs: ascended the hill on north-east side. Searched for water, and, after some time, found a little water in one of the creeks, where we camped, it being after sundown. The country from the last creek is not so good, and very stony; so much so that it has lamed my horse, and nearly worn his shoes through at the tips. Horses have drunk all the water; left none for the morning.

Thursday, December 29.—Started at five minutes to 6 A.M., on same course, for another part of the range. At 6 miles crossed grassy creek, with a few channels, myall, gum; no water; running to north-east, nearly along our line. At 17 miles struck the same creek again, where it is joined by several others coming from the W.N.W. and N.; they are spread over a large broad plain, covered with grass. Searched for water, but could find none; crossed the plains and creeks to a white hill on north course, and at 3 miles reached the top, which is a low chalky cliff; on the banks of the creek changed our course to the first hill I had taken; at 7½ miles reached the top, which we found to be very stony. To the north can be seen three other table-topped hills; a long distance off is the appearance of high red sand-hills, to the north-east is a large stony plain, about 10 miles broad, beyond which are high sand-hills, and beyond that again, a long distance off, is the luminous appearance of water. Not being on the highest point of the range, I proceeded 2 miles to south-east, to get a better view. From here we could see the creek, winding in a south-east direction, until it reached the lake, which, in that direction, seems to be about 25 miles off. We could not distinctly see it owing to the mirage and sand-hills. My horse having lost both his fore-shoes, and no prospect of water further on, I am reluctantly obliged to return to the camp. We saw a little rain-water on the plain, about 7 miles back, at which we will camp to-night. No appearance of any springs. Arrived there a little before sundown. My horse very lame, scarcely able to walk among the stones. I expected to have found a good deal of rain-water, but am disappointed; there seems only to have been a slight shower.

Friday, December 30.—The horses having strayed some distance, we did not get a start till half-past 7, on a course of 323°, to a white hill, to see if there are any springs on the other side. At 1½ miles reached it, but found no

springs; changed course to a very prominent hill, which I have named Mount Arthur, bearing 275° ; can see nothing northward. The Hanson range intercepts the view from this; Mount Kingston bears 202° . After crossing two small myall-creeks, and a stony plain with salt-bush and grass, pretty fair for feed, at 10 miles struck a large myall and gum creek, coming from the north-west, with some very deep channels. We went some miles up it, but could find no water; the courses for the water are too sandy and gravelly to retain it. At 24 miles from the last hill arrived at the summit of Mount Arthur. Changed course to 195° ; at 10 miles struck another myall and gum creek of the same description as the others, coming from the range. No water; camped; horse nearly done up; I am almost afraid he will not be able to reach the camp to-morrow. Country stony and poor.

Saturday, December 31.—Started shortly after daybreak for the camp. At 15 miles struck another myall and gum creek running into the Neale; and at 20 miles the Neale, which is here 3 miles broad. Here we saw some recent native-tracks, and where fires had been lit. Arrived at the camp at sundown; horses quite done up. The country gone over to-day very fair, but in places rather stony. I am sorry that I have been unable to make the lake on this journey. I could have done it, but in all probability should have had to leave my horse; he never would have been able to have done it. I should then have been obliged to walk the distance back, and all the water dried up. Had I seen the least indication of water on ahead I should have gone.

Sunday, January 1, 1860.—In the afternoon it became cloudy. Wind north. No rain.

Monday, Jan. 2.—Having observed a hill on Saturday that seemed to me a spring one, where the Neale comes through the range, I have sent Kekwick to examine it; my eyes being so bad I am unable to go. Sent Müller to examine some more quartz-reefs, in which I think gold exists. Towards sundown he returned with two good specimens, in which I am almost sure there is gold: the reef is 12 feet wide. Shortly after, Kekwick returned and reported springs, and two large water-holes and numerous smaller ones, with abundance of permanent water, although slightly brackish, but will suit any description of stock well. I shall move up there, and fix it as soon as I am satisfied with the search for gold.

Tuesday, January 3.—Sent Kekwick and Müller to get some more specimens of quartz. They have returned with some in which there are very good indications of gold. It is useless for us to try any more, for our tools are in such a state that they are of no use. The reefs would require to be blasted. I am afraid there will be no surfacing here. I have done all that lies in my power to get at it. Without proper tools we can do nothing, so that I shall be obliged to give it up and start to-morrow to the Neale, to where I sent Kekwick yesterday.

Wednesday, January 4.—Started at 8 A.M., and arrived in about 17 miles. The large water-hole is upwards of a mile long, with fully 40 yards of water; in breadth, from bank to bank, 70 yards, and upwards of 15 feet deep. A number of large mussel-shells on the banks. Plenty of good feed all round. To the south there are some low sand-hills covered with grass. To the east in some places it is stony, with salt-bush, grass, &c. Number of broad valleys coming from the Mount Kingston range, with an abundance of grass. About a quarter of a mile to the west of the large hole there is a course of springs coming from the Kingston hills and sand-hills, emptying themselves into the creek. The water is beautiful, and in plenty, and if opened will yield an ample supply for all purposes. To the west are hills with the creek coming through them with water. All the way up to where I crossed it on my return last trip to the north are stony, undulating rises, with salt-bush and grass.

Thursday, January 5.—Examining the country round to the north and round Mount Harvey: the country is poor and stony. On the east and north sides it becomes bad at 3 miles from the creek. There are no other permanent waters for 10 miles below this. The country in the other directions is good, and will be a first-rate run. This, in connection with the Mildred and McEllister springs, will feed any number of cattle.

Friday, January 6.—As my rations are now drawing to a close, being out now three months and more, and having provisions only for three months, I must sound a retreat to get another supply at Chambers Creek. It was my intention to have sent two men down for them, but I am sorry to say I have lost all confidence in the two. I can neither trust them to be sent far, nor dare I trust to leave them with our equipment and horses during the time that Kekwick and myself are gone for the provisions. Situated as I am with them, I must take all the horses down; and if I can get men to replace them at Chambers Creek, I will send them about their business. They have been a constant source of annoyance to me from the very beginning, throughout the whole time; the man that I had out with me on my last journey the worst of the two. They seem to have made up their minds to do as little as possible, and that little in the most slovenly and lazy manner imaginable. They seem to take no interest in the success of the expedition. I have talked to them until I have been completely wearied out. Indeed I am surprised that I have endured it so long: many a one would have discharged them, and sent them back walking to Adelaide; in fact, I had almost made up my mind to do so from here, and run the chance of getting others at Mr. Barker's. Although they have behaved so badly, and so richly deserved to be punished—for they have taken advantage of me when I could get no others to supply their places—I could not find it in my heart to do so. Kekwick is everything I could wish a man to be: he is active, pushing, and persevering. At any time and at any moment he is ready, and takes a pleasure in doing all that lies in his power to forward the expedition. Would that the two men were like him! I should have no trouble at all. Started at 7 A.M. on my return on a south-east course, and camped at a small spring on east side of Mount Young-husband, distant 20 miles.

Saturday, January 7.—Started at 7 A.M. for the Milne Springs. I will remain there a day or two to get all the horses fresh shod, leave what things I do not require, and get them on my return; also to examine the country round the springs and the country to the west. Arrived there at 11 o'clock. Found the water much the same as it was when I first saw it. Good feeding-country all around, and will be a very nice little run.

Sunday, January 8.—Severe attack of lumbago. Sun hot; but cool breeze from south-east.

Monday, January 9.—Unable to ride; am obliged to send Kekwick and one of the men to the westward, for which I am very sorry, as I should like to have seen the country to have connected it with the furthest north-west point of my first journey; but it can't be helped. The other man shoeing the horses. Sun hot; cool breeze from south-east; very cold night and morning.

Tuesday, January 10.—Lat. $28^{\circ} 15' 45''$. Shoeing horses. Flies a great trouble; can do nothing for them: if they are allowed to remain a moment on the eye, it will swell up, and is very painful. Kekwick and the other man returned at 9 o'clock P.M.; they report having found two springs—one about 9 miles west and the other 30 miles, in a large spring country, which they had not time to examine well. Although I am so unwell, I must start to-morrow and see what it is. Judging from their description there must be something good; and I cannot leave without seeing it, although my provisions are nearly done.

Wednesday, January 11.—Shortly after sunrise started with Kekwick on a

west course for the larger spring country, leaving the near one until our return. At 8 miles, bearing to the spring 352° , distant about 9 miles. From this point Mount Younghusband bears 360° , Mount Margaret 153° . $11\frac{1}{2}$ miles crossed the Blyth coming from the south. At 16 miles low sand-hills with broad valleys. At 28 miles reached the spring country. Changed to 160° , and at 2 miles camped at the spring, having found another a quarter of a mile to the north of this. Shortly after changing our bearing we discovered some patches of reeds: no water on the surface, but ground very soft and boggy. I have not the least doubt but there is plenty of water if opened. The springy place has the appearance of a large salt-lagoon 3 miles broad to upwards of 8 miles; stony. At the south end of it is a creek with brackish water, on the banks of which are the springs: the water from them is very good; they are not running.

Thursday, January 12.—The country travelled over yesterday was stony and undulating, with salt-bush and grass: the sand-hills are well grassed. Fall of the sand-hills to the north. Started on a south course. At $4\frac{1}{2}$ miles came upon a creek with reeds and brackish water running a little to the west and north. Traced it down for upwards of a mile and a half; saw that it ran into the swamp west of where we struck it. Could see no springs upon its banks. Returned to the place where we first struck it, and proceeded on a course of 120° to three large patches of reeds. At 1 mile reached them; searched all round, but could find no surface-water except what was brackish; the reeds and rushes very green: if opened would yield an abundant supply. The reeds are about 8 feet high, and country moist all round. Thence 120° , 2 miles, on the top of a sand-hill. Sent Kekwick to examine places that looked like springs: found them to be so; one very good, with water up to the surface. The other requires cleaning out, as it has got choked up. They are in the middle of apparently a large salt-lagoon, which is a crust of limestone, under which the water is; and if broken through in many places, where there is no sign of water, a beautiful supply could be obtained. Changed to 240° , to see what was on the other side of the sand-hill. At 3 miles arrived at the last of them. Below us, running to the north, and joining the lagoon, is a salt-creek coming from the south, with gypsum-cliffs on the north-west banks. Beyond that is high table-land running to north-west. About 15 miles distant changed course to 90° through sand-hills. If we do not find other springs, will camp at those found to-day. Examined the country all round: could find no more. We have rounded all the country that has any appearance of them, which is low sand-hill covered with grass. We have seen many places where water can be obtained at a few inches below the surface. Camped at the spring. Feel ill; can scarcely sit on the horse.

Friday, January 13.—Anxious to see what was the country between this and the Mount Margaret range, at $\frac{1}{2}$ past 6 A.M. started on a course of 110° , over occasional sand-hills and stony places, with splendid feed. At $10\frac{1}{2}$ miles reached the top of a stony rise. Changed course to 76° , to a black hill, 5 miles, composed of ironstone. Changed to 105° , to examine a white place coming down from the range which had the appearance of springs. At 1 mile found it to be composed of white quartz. Changed again to 50° , to a rough hill, which had also the appearance of springs. At 2 miles crossed the Blyth, which takes its rise in the range and sand-hills: no water in it, but loose sand and gravel. At 7 miles reached the rough hill, after crossing three other smaller tributaries. Was disappointed in not finding water. Ascended the hill, from which we had a good view of the surrounding country, but could see no indications of water. The country all good, a little stony in places. I must now make for the second spring they found. Course north, over stony hills and table-land, in which I crossed my former tracks, going to the Freeling Springs. Arrived at the springs at $\frac{1}{2}$ past 7 P.M. very tired, both horses and ourselves.

Saturday, January 14.—Examined the spring, and found it to be a very good one. It is situated near the banks of the Blyth, in the same springy ground that I discovered last time, and which was marked off as a run. I have fixed them correctly from the Trigonometrical Survey. Searched about, and found other two springs, very good ones. There is plenty of water in the creek; but, in consequence of the dry season, it is rather brackish. In the rocks the water is oozing out in many places. As I had not had an opportunity of examining the few creeks that came from the east side of the lower range of Mount Margaret, I devoted the rest of the day to that purpose; and at $2\frac{1}{2}$ miles from the other springs discovered a spring in one of the creeks that runs east. It is a small one, and would do for a station. The natives had cleaned it out. The water is about 2 feet from the surface, and is very good. In the other two creeks we also found springs that require opening, which is all we could see. I then made for the camp, where I found everything right. I forgot to mention that there are a number of natives at the West Springs. We saw their smokes and a number of tracks, some quite fresh, and some older.

Sunday, January 15.—Preparing for a start to-morrow for Chambers Creek by way of Loudon Springs, and endeavour to find some more springs; for I am not quite satisfied yet about that country. Very much annoyed at the two men I left behind at the camp. They have had the impertinence to open my plan-case, examining and spying into everything I had; and, worse than all, have spoiled my principal plan, on which I bestowed a great deal of care and labour during our search for gold, and had it all ready prepared for tracing off when we arrived at the creek. They have made it in such a dirty state, from the perspiration of their hands, which I cannot get off, that I know not what to do with it. It will cost me a great deal of labour and time to plot it all over again. This is not the second nor third time it has been done. I only trust I shall be able to get other men at the creek.

Monday, January 16.—Milne Springs. Started at 10 minutes past 7, on a bearing of $135^{\circ} 30'$. At about 22 miles struck four other springs, beyond the Messrs. Levi's boundary. From one spring there is a strong stream of water flowing. They are almost completely hidden, and one cannot see them until nearly on the top. The country around is good—salt-bush and grass. I was much surprised to find horse-tracks here; they are the same as I saw at Loudon Spa, and also in the Mount Younghusband ranges, but could not track them any farther north. I have taken bearings to fix them, and have named them Kekwick Springs. Arrived at Loudon Spa at 5 p.m., distance 31 miles.

Tuesday, January 17.—Loudon Spa. Started shortly after daybreak, on a course of 110° , over as fine a grassed country as I have yet travelled. There are a few stones on the surface, with good salt-bush; also a few low sand-hills and gypsum-hills at intervals. At 16 miles crossed the Douglas, running through sand-hills covered with grass, but no water, nor any signs of springs. Proceeded in the same direction for 8 miles, where we were stopped by a lagoon. Here we searched for springs, but could find none. Changed my course to south-south-west, to a hill that had the appearance of water, but found beyond it another large dry lagoon, on the banks of which we saw the tracks of a single horse crossing the end of the lagoon, and steering for Lake Torrens. They seem to be about two months old. Can they be the tracks of that infatuated man who left me on the 20th of November? In all probability he has lost my downward track and himself. They are only about 2 miles to the east of mine. Searched for a spring till nearly sundown, but could see none. Country still very good. Camped without water.

Wednesday, January 18.—Sand-hills. Started shortly after daybreak on a south-south-east course, still in search of springs (crossing my outward track of last journey) at a place where I thought it most likely for them to be, but unsuccessful in finding any. It was my intention, could I have found one, to have gone direct to the Emerald Springs, but the horses would suffer very much if they were to be another night without water, the food being so dry and the weather so hot, they are not able to stand more than two days and one night without it. Changed my course to Strangways Springs; arrived there at 4 past 2; some of the horses much done up. Camped here, and gave them the rest of the day to recruit.

Thursday, January 19.—Strangways Springs. Started after breakfast for the Beresford Springs; at 9½ miles arrived there. At 8 miles made the Hamilton Springs, where we camped for the night.

Friday, January 20.—Hamilton Springs. Started early by way of the Emerald Springs to see if Mr. Barker's party is there. Got the parcel forwarded to Mr. Chambers. Arrived at the spring, and found Mr. Barker's party had gone; went to Chambers Creek and found them there.

Saturday, January 21.—Chambers Creek. Here we found provisions waiting us, as we expected; but the two men still exhibit a spirit of non-compliance, and refused to proceed again to the north-west. They are bent upon leaving me and returning to Adelaide, although they know there are no men here to supply their places. They have demanded their wages and discharge, which, under all circumstances of the case, and considering how badly they have served me, I feel myself justified in withholding. I shall therefore be compelled to send Kekwick down as far as Mr. Chambers' station with my despatches, and to procure other assistance. This will cause a great loss of time and expense, which the wages these men have forfeited by their non-fulfilling their agreements will ill repay. Here we heard of the man Smith, who, it seems, left the mare, whether dead or alive, we know not at present. He was lost for four days without water, according to his own account; and after various adventures, picking up sundry trifles from different travelling parties, who relieved him out of compassion, he reached the settled districts in a most forlorn condition. Mr. Barker had left his station some three weeks before we arrived.

VII.—*Journal of Australian Exploration.*—By MR. JOHN M'DOUALL STUART, Gold Medallist, F.R.G.S.

Read, February 11, 1861.

Friday, March 2, 1860.—Chambers Creek. Left the creek for the north-west, with thirteen horses and two men; left the grey horse behind, being too weak to travel. Camped at the Hamilton Springs.

Saturday, March 3.—Mount Hamilton. Camped at the Beresford Springs. Here we saw that the natives had had a fight. A little from us is their camp, where are the remains of the body of a male native, who appears to have been very tall, lying on his back, feet to the north-west. The skull is broken in three or four places, the flesh nearly all devoured by the crows and native dogs, both feet and hands gone. There are three wurlies on the rising ground, round about which are some waddies, boomerangs, one broken, a spear, and a number of broken dishes. They seem to have run away and left them, or to have been

driven away by a hostile tribe. Between two of the wurlies we observed a handful of hair, apparently torn from the skull of the dead man, and a handful of emu feathers placed close together; the feathers to the north-west, the hair to the south-east, between two pieces of wood that had been burnt, but apparently the fire had been extinguished before the feathers and hair were placed there. They seem intended as a mark of some description.

Sunday, March 4.—Beresford Springs. Again we feel the night and mornings cold. This day has been very hot, the wind from the north-west. Yesterday it was from the east, this afternoon it is from the south-west; very hot.

Monday, March 5.—Beresford Springs. During the night the wind changed from the east; towards morning it became very cold. Arrived at the Strangways Springs. Wind, variable; very hot.

Tuesday, March 6.—Strangways Springs. During the night, very hot; a few clouds rising this morning from the south-west. Made William Springs and camped, the day exceedingly hot; wind, south-west. About noon a heavy bank of clouds arose in that direction; in the evening a great deal of lightning and apparently rain falling there, but none has come this way.

Wednesday, March 7.—William Springs. The night very hot; no rain, still cloudy, with the wind from the west. Started on a course for the Louden Spa; travelled over a well-grassed country, the first few miles was over low sand-rises, and broad valleys of light sandy soil with abundance of grass, but dry. By keeping a little more to the north-west the sand-rises can be avoided; at 7 miles we struck a swamp, a little moisture, but could see no springs. In approaching the Douglas the country became more stony, which continued to the Spa. The sun has been extremely hot.

Thursday, March 8.—Louden Spa. Cold wind this morning from the south-east. Clouds all gone. Camped at Hawker Springs.

Friday, March 9.—Hawker Springs. Very cold last night; wind from the south, during the day changed to the south-east; the sun very hot. Camped at the Milne Springs; found the articles we left here all right. The natives had opened the place where we had put them, but had taken nothing. A few heavy clouds in the east and south-east, also in the north-west.

Saturday, March 10.—Milne Springs. At half-past 11 o'clock last night it began to rain, and continued heavy all the morning. Sunrise, still raining, coming from the south-east, for which I am very thankful. It has rained the whole day without intermission.

Sunday, March 11.—Milne Springs. About 10 o'clock last night we were flooded by the rains, although upon rising ground, and were obliged to move our camp to the top of a small hill. It rained all night and morning, but there are signs of a break in the clouds. During the day it has rained at intervals. The creek is coming down very rapidly, covering all the valley with sheet of water.

Monday, March 12.—Milne Springs. A few heavy showers during the night, but now the appearance of a fine day, which will enable us to get our provisions dried. The country is very boggy, which makes it impossible for me to proceed, but if it continues fair throughout the day and night I shall attempt it to-morrow morning. This rain is a great boon to me, it will give both feed and water for my horses. If it is gone to the north-west it will save me a great deal of time looking for water. The rain has come from the south-east, also the wind, and still coming from the same direction, with heavy clouds.

Tuesday, March 13.—Milne Springs. Started for the Freeling Springs. The country in some places very soft, but better travelling than I expected. As we approach Mount Younghusland the rain does not seem to have been so heavy; but when we came to the Peak we found it running bank high and

very boggy. Impossible to cross it here, I must now follow it up to find a ford in a west south-west direction; a large quantity of rain must have fallen to the westward. Camped at Freeling Springs. Wind, south-east; heavy clouds all round.

Wednesday, March 14.—Freeling Springs. Started on a course a little to the south of west to try and find a crossing-place in the Peak. At 2 miles it turned a little to the north of west, but at 10 miles to the south-west. It is running very rapid, about 5 miles an hour. At this point I am obliged to stop; cannot cross the creek in consequence of the banks being so very boggy. I cannot get the horses across. The bearing to the Freeling Springs is 96° ; Mount Younghusband, $120^{\circ} 30'$; Mount Kingston, $72^{\circ} 30'$. On the same bearing as the Freeling Springs, at 11 miles, I have discovered another spring; I cannot get to it to examine it. From here it has the appearance of being very good; a hill covered with reeds at the top, the creek running round the east side of it. The country on this side (the east) consists of sandy hills, covered with grass and other food, of which the horses are very fond. I shall endeavour to cross to-morrow and examine it. Wind, east-north-east; at sundown heavy clouds to the north-west and south-east.

Thursday, March 15.—Peake. The creek still impassable. Will require to remain here another day. Yesterday the horse that was carrying my instruments broke away from the man that was leading him, burst the girths, and throw the saddle-bags on the ground. The instruments are very much injured, very nearly ruined; the sextant being put out of adjustment, has taken me all day to repair, and I am not sure now whether it is correct or not. It is a great misfortune. Wind, north; clouds, north-east.

Friday, March 16.—Peake. Wind, south-west; appearance of rain from that quarter. Saddled and started to cross the Peake about 3 miles to the south-west, but had a fearful job in crossing it, the banks being so boggy and the current so strong. The horses could hardly keep on their feet, most of them up to their saddle-flaps. Camped on the west side of the springs that we saw from the last encampment, which I have named Kekwick Springs. There are six springs, the largest one will require to be opened; the reeds on it are very thick, and from 10 to 12 feet in height. It looks very black and stormy. Wind from the south-west. We lost a horse in the bog.

Saturday, March 17.—Kekwick Springs. About 8 o'clock last night the wind changed to the north-west. We had some very heavy rain, which lasted the greater part of the night. Early in the morning the wind changed again to the south-east, with occasional showers; at sunrise it looks very stormy. I must be off as soon as possible out of this boggy place. I would have remained here to-day to have dried my provisions, but the appearance of the weather will not allow me. They must take their chance. Started on a north-west course for the Neale. At 15 miles changed to the west, to a creek coming south. From the stony rises 3 miles, the banks of the Neale very boggy. The first 4 miles to-day was along the top of a sandy rise, swampy flats on each side, with a number of reeds growing in them, also rushes and water-grass. At 4 miles is a strong rise, but before we arrived at it we had to cross one of the swamps in which we encountered great difficulty. After many twistings and turnings, bogging up to the shoulders, we managed to get through, all safe. It was fearfully hard work. For 3 miles, along the top of a stony rise, the country is poor, stony on the top of gypsum deposit; but after that it gradually improves, and towards the creek it becomes a good salt-bush country. Wind, from the south-east; still very cloudy.

Sunday, March 18.—Neale River. Wind south-west, heavy clouds. I observe a bulbous plant growing in this creek, resembling the Egyptian arum. It is just springing. I will endeavour to get some of the seed, if I can. Rain during the night, and there is an appearance of more to-day. I was in hope we

would have got our provisions dried to-day. I wish it may clear up that we may do so. Showery all day; could not get it done. Wind changed to east-north-east. The creek so boggy that we cannot cross it; must follow it round to-morrow. A sad accident has happened to my plans. There was a small hole in the case that contained them that I did not observe, and in crossing the Peake the water gained admission and completely saturated them: it is a great misfortune. Sundown, still raining; wind same direction.

Monday, March 19.—Neale River. Rained during the night; looks very stormy this morning. Followed the Neale round to where it goes through the gap in Hanson Range. In places it was very boggy, but good travelling in this wet weather—firmer than I expected. We had some difficulty in crossing some of the side creeks. Camped on the south side of the gap. Wind, south-east; cloudy, with little rain.

Tuesday, March 20.—Neale River Gap, Hanson Range. Wind, south-east; a few showers during the night. Still no chance of getting my provisions dried. It cleared off about noon, and has become a fine day. Followed the Neale River round, and camped on one side of the creek, coming from the south of west. Ground still soft. Wind, south-east. Saw some smoke in the hills this morning, but no natives. Good country along the range on both sides on the west side of the Neale.

Wednesday, March 21.—Neale River. Beautiful sunshine; shall remain here to-day, in order to dry my provisions. On examining them I find that a quantity of our dried meat is quite spoiled, which is a great loss; another wet day, and we should have lost the half of it. Variation, $4^{\circ} 10' E$; lat. $28^{\circ} 29'$; long. 135° . Wind, south-east.

Thursday, March 22.—Side-creek of the Neale River. Wind, south-west; clear sky. I intended to have gone north-west from this point, but, in attempting to cross the creek, we found it impassable. My horse got bogged at the first start. We had some difficulty in getting him out. Were obliged to follow the creek westward for 7 miles, where it passes between two high hills connected with the range, hereby steering in every direction. We managed with great labour and difficulty at last to get across without accident. At this place four creeks join the main one, and spread over a mile in breadth, with upwards of twenty boggy watercourses; water running. It has taken us 5 hours from the time we started to cross it. The principal creek comes from the south-west. I ascended the two hills to get a view of the surrounding country. I could see the creek coming from a long way off in that direction. At this point the range seems broken or detached into numerous small ranges and isolated hills. I now changed my course to north-west over table-land of a light-brown colour, with stones on the surface; the vegetation is springing all over it and looking beautifully green. At 6 miles on this course camped on a myall creek. The work for the horses has been very severe to-day, which has caused me to camp sooner than I intended. Wind, south.

Friday, March 23.—Myall-creek. Wind, south. Started on the same course north-west. At 3 miles crossed another tributary—gun and myall. The country before we struck the creek is good salt-bush country, with a plentiful supply of grass. The soil is of a light-brown colour, gypsum underneath, and stones on the surface, grass and herbs growing all round them. After crossing the creek, which was boggy, we again ascended a low table-land of the same description. At 10 miles came upon a few low sand-rises, about a mile in breadth. We struck a creek (another tributary) spread over a large plain, very boggy, with here and there patches of quicksand. We have had great difficulty in getting over it, but at last succeeded without any mishap. We then entered a thick scrubby country of mulga and other shrubs; the soil now changed to a dark red, covered splendidly with grass. After the first

mile the scrub became much thinner; ground slightly undulating. After crossing this good country, at 20 miles we struck a large creek, running very rapidly at about 5 miles per hour; breadth of water 100 feet, with gum-trees on the bank. From bank to bank it is 44 yards wide. This seems to be only one of the courses. There are other gum-trees on the opposite side, and apparently other channels. Wind, south; a few clouds from the north-west.

Saturday, March 24. Large gum-tree creek. Found it impossible to cross the Neale River here; the banks are too boggy and steep. Have, therefore, followed it round on a west course for 3 miles; find that it comes a little more from the north. Changed to 290°, after trying to cross the creek at this point, but could not. At about 4 or 5 miles south-south-west from this point there are two high peaks of a low range. The higher one I have named Mount Ben, and the range Head's Range: its general bearing is north-west. Opposite to this point it turns more to the west. I can see another spur further to the west, trending north-west. At $4\frac{1}{2}$ miles after leaving we found a ford, and crossed the horses all safe. I then changed to the north-west again through a scrubby country—mulga, acacia, hakea, salt-bush, and numerous others, with a plentiful supply of grass. The soil is of a red sandy nature, very loose, does not retain water on the surface. We had great difficulty in getting through, many places being so very thick with dead mulga. We have seen no water since we left the creek; distance 18 miles. I am obliged to camp without water for ourselves. We observed fish in the Neale River as we crossed it of a good size, about 8 inches long, from which I should say that it is permanent. I shall have to run to the west to-morrow, for there is no appearance of this scrubby country terminating. I must have a whole day at it.

Sunday, March 25.—Mulga-scrub. I can see no termination on this course to the thick scrub. I can scarcely see 100 yards before me. I shall therefore bear to the west, cut the Neale River, and see what sort of a country is in that direction. At 10 miles made it; the water still running, but not so rapid. The gum-trees still exist in its bed, and there are large pools of water on the side-courses. We had the same thick scrub to within a quarter of a mile of the creek, where we met a line of red sand-hills, covered with a spinifex. The range on the south-west side of the creek seems to terminate here and become low table-land, apparently covered with a thick scrub, the creek coming more from the north. I do not like the appearance of the spinifex, an indication of desert to the westward. Camped on the creek. Wind, north-west; heavy clouds from the same direction.

Monday, March 26.—The Neale River West. I am obliged to remain here to-day to repair damage done to the packs and bags, which have been torn all to pieces; it will take the whole of the day to put them in order. We have seen very few signs of natives visiting this part of the country. I shall go north to-morrow, and try to get through this scrub. Wind south; sky overcast with heavy clouds; looks like rain.

Tuesday, March 27.—West Neale River. Rained very heavily during the night, and is still doing so, but less copiously; about noon it cleared up a little. I have sent Kekwick to get a description of the country on the other side of the low range, while I endeavoured to obtain an observation of the sun. The range is scrubby, composed of a light coloured and dark-red conglomerate volcanic rock, easily broken: the view from it is not extensive. At a mile from the creek the sand ceases, and stony ground succeeds the range. Feed excellent. South-west from the camp, to the eastward, rugged hills, apparently with fine open grass and forest land; numerous rows of water-holes visible in the south-east; country more open to the south; south-east and south still the same good country; from the south to west the same; hills to the west from 5 to 8 miles distant. View from another hill north-west $2\frac{1}{2}$ miles. The hills

west still continue towards the north-west, but become lower; country scrubby, with occasional patches of open grass-land; creek coming in from west-north-west. From north-west to north-north-east mulga-scrub; from north-north-east to east low range in the distance like table-land. Too cloudy to take observation; occasional showers during the day. Wind south-south-east; still looking very black. Repairing my saddles; some of my horses are getting bad backs.

Wednesday, March 28.—West Neale River. Started on a north course to get through the mulga-scrub. At 10 miles can see the range to the north-east. The scrubby land is becoming sand-hills; I can see no high ground on ahead, the scrub becoming thicker; it seems to be the same sort of country that I passed through on my south-east course (first journey), and I think a continuation of it. I shall therefore change my course to the north-east range bearing 35°. At 5 miles through the same description of country—mulga scrub, with plenty of grass. At that distance we arrived at water, where three creeks join, one from the south-west and west-north-west, with large long water-holes; also water-holes in the other two; gum-trees in the creek. I suppose this to be the Frew; excellent feed on the banks of the creek up to the range, which is stony. I ascended the table-range, in order to have a view of the country round. To this point the range is coming from the east-south-east; but here it takes a turn to the range east of north—all flat-topped and stony, with mulga-bushes on the top and sides; the rocks are of a light flinty nature. At about 6 miles north the country seems to be open and stony. This country I will steer for to-morrow. To the north-east is the range, which seems to drop into the table-land. Distant about 15 miles to the north-west and west is the thick mulga-scrub. There are numerous tracks of natives in the different creeks, quite fresh apparently. To-day wind south-east; clouds.

Thursday, March 29.—Frew. Started in a north course. At 1 mile, after crossing a stony hill with mulga, we suddenly came upon the creek again, which winds round the hill. Here another branch joins it from the north, the other coming from the east of north. Along the base of the range there are very large water-holes in both branches. Here we find natives camped last night; their fires are still alight; they seem only just to have left. From the numerous fires, I should think there has been a great number of natives here. All round about are numerous tracks in every direction. We also observed a number of winter habitations on the banks of the creek; also a large native grave, composed of sand, earth, wood, and stones of a circular shape, about 4½ feet high, and 20 or 24 yards in circumference. The mulga continued for about 6 miles; but at 3 miles we again crossed the north branch of the creek, coming now from the north-west. The mulga is not thick except on the top of the rises, where splendid grass is growing all through it, and very thick at the end of the scrub. We now come upon the open stony country with a few mulga creeks. There is a little salt-bush and an immense quantity of green grass, growing about a foot high, which gives to the country a beautiful appearance. It seems to be the same all round as far as I can see. At 14 miles we struck the other branch where it joined, with splendid reaches of water, to the main one, which is now coming from the west of north, and continues to cross our line on the east branches. This seems to be the place where it takes its rise. Camped for the night. The whole of the country that we have travelled through to-day is the best for grass that I have ever gone through. I have nowhere seen its equal. From the number of natives, from there being winter and summer habitations, and from the native grave, I am led to conclude the water there is permanent. The gum-trees are large. I saw kangaroo-tracks.

Friday, March 30.—Small branch of Frew. Course north. At 2½ miles

changed course to 332° to a distant hill, apparently a range of flat-topped hills. At 16 miles crossed a large gum-creek running to the south of east: it spreads out over a flat between rough hills of half a mile wide. The bed is very sandy; it will not retain water long. On the surface it very much resembles the Douglas, but broader, and the gum-trees much larger. There might be permanent water-holes to the east or west. There are some rushes growing in its bed. I have named it the Ross. We then ascended the low range for which I have been steering. 4 miles from the creek it is rough and stony, composed of igneous rock; scrub, mulga, plenty of grass quite to the top. To continue this course would lead me again to the mulga-scrub, where I do not want to get if I can help it. It is far worse than guiding a vessel at sea; the compass requires constantly to be in hand. I have again changed to the north, which appears to be open in the distance. I can see another range of flat-topped hills. After crossing over several small spurs coming from the range, and a number of small creeks, volcanic, stony, we struck another large gum-creek coming from the south of west, and running to the south-east. It is a fine creek. These courses of water spread over a grassy plain a mile wide; the water-holes are long and deep, with plants growing on their banks, indicating permanent water. The wild-oats on the bank of the creek are 4 feet high. The country gone over to-day, although stony, is completely covered with grass and salt-bush; it is even better than that passed yesterday; there is some of it resembling the drake, some the wild wheat and rye, the same as described by Captain Sturt. There is a light shade over the horizon, from the south-east to north-east, indicating the presence of a lake in that direction. I have named the creek the Stevenson. There are small fish in the holes of it, and mussel-shells, also crabs about 2 by $\frac{1}{4}$ inches.

Saturday, March 31.—The Stevenson. I am obliged to remain here to-day; my horses require shoeing. The country cuts up the shoes very much.

Sunday, April 1.—The Stevenson. I find to-day that my right eye, from the long continuation of bad eyes, is now become useless to me for taking observations. I now see two suns, instead of one; it has led me into an error of a few miles; I trust to goodness my other one will not become the same; as long as it remains good, I can do. Wind, east, cool; heavy clouds.

Monday, April 2.—The Stevenson. Started at eight o'clock, course 355° , to distant hills. At 6 miles we struck a gum-creek, with water in it, but not permanent. At 10 miles we crossed another, running between rugged hills; a little water coming from the west, and running east-south-east, through a mass of hills running in every direction. At 12 miles crossed a valley $\frac{1}{2}$ mile broad, through which gum-creeks empty themselves all over it; immense quantity of drift timber lying on their banks. At 20 miles arrived at the first part of the range, and at 28 miles camped on a gum-creek running east, and coming from the south-west. The first 3 miles of to-day's journey was over good country; it then became rather scrubby, mulga and other shrubs, with numerous small creeks and valleys running to the east, plenty of grass and salt-bush, with gravel, ironstone and lime on the surface. At a mile before we made the rugged creek the ironstone became less, and a hard, white stone took its place, and continued to the range, on which is also gypsum, chalk, ironstone, quartz, and other stones. The other hills are composed of the same. There are also a few of a hard red sandstone. The range is broken, and running nearly east and west. The country round them is stony and undulatory, numerous small creeks running to the eastward, with a deal of grass and salt-bush; no water in this creek. Camped without. Wind, east.

Tuesday, April 3.—Gum-creek south of range. Ascended the hill at 3 miles from last night. Camped. The country very rough, stony, scrubby, and very bad. The view from this point is very extensive. I have named it Mount Beddome, after Samuel Beddome, Esq., of Adelaide. To the west is

another broken range, about 15 miles distant, of a dark-red colour, running nearly north and south. The country between is apparently open, with patches of grass. A gum-creek coming from the south-west, and running some distance to the north-east; it then turns to the east. In the distant west appears a dense scrub. On a bearing of 330° there is a large, isolated table-hill, for which I shall shape my course, to see if I can get an entrance that way. To the north are a number of broken hills and peaks; scrub between; they are of every shape and dimensions. To the north-east, another flat-topped range; country between also scrubby, apparently open. Close to the range, distant about 20 miles, saw hills in the far distance; to the east, another small flat-topped range; between it and the other the creek seems to run. The highest point of it bears 80° ; and I have named it Mount Daniel, after Daniel Kekwick, Esq., of Adelaide. From east to south-east, the country is open and grassy; low ranges in the distance. Saw some rain-water, bearing 30° , to which I will go, and give the horses a drink; they had none last night. Distance 2 miles, obtained an observation of the sun, $118^{\circ} 17' 30''$. At 6 miles, crossed the broad bed of a large gum-creek; gravel, no water. At 8 miles, the red sand-hills commence, covered with spinifex, and on the small flats mulga-scrub, which continues to the base of the hill; red, loose sand; no water. Distance 20 miles from Mount Beddome to this hill, the country good, until we get among the spinifex.

Wednesday, April 4.—Mount Humphries. Break of day ascended the mount, which is composed of a soft, white, coarse sandstone. On the top is a quantity of water-worn quartz, cemented into large masses. The view is much the same as from Mount Beddome; broken ranges all round the horizon; apparently a dense scrub from south-west to west. It then becomes open and grassy country, with alternate patches of scrub. I can see a gum-creek about 2 miles distant; I can also see water in it. The horses have not discovered the water; I shall therefore have to go in that direction, to give them a drink. To the north and eastward the country appears to be good. Went to the water, two miles north-east, being anxious to know if there is water I can depend upon. On my return, wanting to correct my instrument, which met with an accident three or four days ago; the girths getting under the horse's belly, he bolted, and kicked it off. I sent Kekwick to examine the creek; also another I could see coming from the north. Plenty of water to serve our purpose. The creeks very large, with the finest gum-trees we have yet seen, all sizes and heights. This seems to be a favourite place for the natives' camping. There are eleven wurlies at one encampment. A number of new parrots, the black cockatoo, and numerous other birds we saw here. The creek runs over a space of about 2 miles, coming from the west; the bed sandy. After leaving on a bearing 329° for 9 miles, we passed over a plain, as fine a country as any man would wish to see, a beautiful red soil, covered with grass a foot high; after that it becomes a little sandy, and at 15 miles got into some sand-hills, but still the feed most abundant. I have not passed through such a splendid country since I have been in this colony; I only hope it may continue. The creek I have named the Finke, after William Finke, Esq., of Adelaide, my sincere and tried friend, and one of the liberal promoters of the different explorations I have the honour to lead. Wind, south-east, and cloudy.

Thursday, April 5.—Good country. Started on the same course to some hills, through sand-hills and spinifex for 10 miles. Halted for half-an-hour, to obtain an observation of the sun, $117^{\circ} 16'$. Within the last mile or two we have passed a few patches of shea-oak, growing large, having a very rough and thick bark, nearly black; they have a dismal appearance. The spinifex now ceases, and grass is taking its place. As we approach the hills, from the top of the hill the view is limited, except the south-west, which is a long way. In the far distance is apparently a long range; the country between seems to be

scrub, red sand-hill, and spinifex. To the west the country is open, but at 5 miles it is intercepted by the point of the range that I am about to cross. To the north-west, north, and east, is a mass of flat-topped hills, of every size and shape, running always to the east. Camped on the head of a small gum-creek, among the hills; rain-water, good feed among the hills, which are composed of the same description of stone as the others. This water-hole is 3 feet deep, and will last a month or so.

Friday, April 6.—Small gum-creek in range of hills. Started on same course, 330° , to a remarkable hill, which has the appearance at this distance of a locomotive engine with its funnel; the native cucumber growing here. For 3 miles the country is very good, but after that high sand-hills succeeded, covered with spinifex. At 6 miles, we got to one of the largest gum-creeks I have yet seen. It is much the same as the one we saw on the 4th, running water. Great difficulty in crossing it, its bed being quicksand. As we were nearly across, I saw a black fellow among the bushes; pulled up, and called to him. At first he seemed at a loss to know where the sound came from. As soon, however, as he saw the other horses coming up he took to his heels, and was off like a shot. We saw no more of him. As far as I can judge, the creek comes from the south-west. The sand-hills are so high, and the large black shea-oak so thick, that I cannot distinguish the creek very well. These trees look so much like gums in the distance; some of them are very large, as also are the gums in the creek. This is the upper part of the Finke. Numerous tracks of blacks all about. At this point the creek runs through high sand-hills (red), covered with spinifex, which is very difficult to get the horses through. We passed through a few patches of good grassy country. In the sand-hills the oak is getting more plentiful. We were three-quarters of an hour in crossing the creek, and obtained an observation of the sun, $117^{\circ} 26' 15''$. We then proceeded on the same course towards the remarkable pillar, through high, heavy sand-hills, covered with spinifex, and at 12 miles from last night's camp, arrived at it. It is a pillar of sandstone, standing on a hill upwards of 100 feet high. From the basis of the pillar to its top, is about 150 feet, quite perpendicular; 20 feet wide, by 10 feet deep, with two small peaks on the top. This pillar I have named the Chambers Pillar, in honour of James Chambers, Esq., who, with William Finke, Esq., are my principal supporters in all my explorations. To the north and north-east of it are a number of remarkable hills, which have the appearance of old castles in ruins; they are standing in the midst of sand-hills. Proceeded still on the same course, through the sand-rises, spinifex, and low sand-hills, at the foot of which we saw rain-water, where I camped. To the south-west are some high hills, through which I think the Finke comes. I would have followed it up, but the immense quantity of sand in its bed shows that it comes from a sandy country, which I wish to avoid, if I can. Wind, south-east; heavy clouds, very like rain.

Saturday, April 7.—Rain-water under sandstone-hills. Started on same course, 330° , over low sand-rises and spinifex, for 6 miles. It then became a plain of red soil, with mulga-bushes, and for 7 miles was as fine a grassed country as anyone would wish to look at; it could be cut with a scythe. Dip of the country to the east, sand-hills to the west; afterwards it became alternate sand-hills and grassy plains, mulga, mallee, and black oak. From the top of one of the sand-hills I can see a range which our line will cut; I shall make to the foot of that to-night, where I expect I shall find a creek with water. Proceeded through another long plain, sloping towards the creek. We again met with sand-hills and spinifex, which continued to it. Arrived, and camped; found water. It is very broad, with a sandy bottom, which will not retain water long; beautiful grass on both banks. Wind, east, and cool.

Sunday, April 8.—The High Gum-creek. I have named this creek the

Hugh, and the range James; the range is scrubby on this side and is not flat-topped, as all others have been, which indicates a change of country. On the other side the bearing is nearly east and west. Examined the creek, but cannot find sufficient water to depend upon for any length of time; the gum-trees are large. Numerous parrots, black cockatoos, and other birds. Wind, east; very cold during the night.

Monday, April 9.—The Hugh Gum-creek. Started at north-west course to the highest point of James Range. At 4 miles arrived on the top, through a very thick scrub of mulga; the range is composed of soft red sandstone, long blocks of it lying on the side. To the east, apparently red sand-hills; beyond which are seen the tops of other hills to the north-east. North-west the view is intercepted by a high broken range, with two very remarkable bluffs about the centre. The east one, and apparently the highest, 348°, for which I will direct my course; in the country between, one lower range, between which are apparently flats of green grass, and red sand-hills. To the west are grassy flats next to the creek; beyond these are seen the tops of distant ranges and broken hills; at about 6 miles the Hugh seems to turn more to the north towards a very rough range of red sandstone. We then descended into a grassy flat with a few gum-trees, running west. We have had a very great difficulty in crossing the range, and now I am again stopped by another low range of the same description, which is nearly perpendicular—huge masses of red sandstone on its side, and in the valley a number of native camps (old). After following the range 3 miles, we at last found out a place to cross. Although this is not half the height of James Range, we encountered far more difficulty; the scrub was very dense, a great quantity being dead and lying down; we could scarcely get the horses to face it. Our course was also intercepted by deep perpendicular ravines, which we had been obliged to round after a great deal of trouble, having our saddle-bags torn to pieces, and our skin and clothes in the same predicament. We arrived at the foot nearly naked, and got into open sandy rises and valleys with mulga and plenty of grass, among which there is some *spinifex* growing. About 8 miles—sun-down—made a large gum-creek, in which we found some water; it is very broad, with a sand and gravel bottom—of the same character as the one we were on yesterday, the sand lies on the top of limestone. Camped both men and horses; very tired.

Tuesday, April 10.—Gum-creek, bend of the Hugh. I find our saddle-bags and harness are so much torn and broken that I cannot proceed until they are repaired. It is with great reluctance that I am compelled to remain here to-day. This creek is running to the west. On ascending a sand-hill this morning I found it to be the Hugh, which seems to drain the sand-hills which we saw to the east from the top of James Range that is still between us and the high range; at about 4 miles west it seems to break through the rough range and join the Hugh. Plenty of water, a large number of native encampments; rushes growing in and about the creek.

Wednesday, April 11.—Bend of the Hugh. Got the things put pretty well to rights and started towards the High Bluff. I find that my poor little mare Polly has got staked in the fetlock-joint, and is nearly dead lame. I must proceed. At 6½ miles, we again crossed the Hugh, and at another mile found it coming through the range, which is a double one. The south range is red sandstone, the next is hard whistone and also red sandstone, with a few hills of ironstone; a valley lying between, well grassed. The two gorges are rocky, and in some places perpendicular, with some gum-trees growing on the sides; large quantities of the cucumber-plant growing; water in abundance; rushes growing. At 12 miles we got through both gorges of the range, which I have honoured by naming it the Waterhouse, after the Honourable the Colonial Secretary. The country between last night's camp and the range is a red sandy soil, with a few sand-hills, on which is growing the *spinifex*; but the

valleys between are broad and beautifully grassed. There is also a little mignon-scrub, but not thick. On the north side of the range we travelled through country much the same, all good; and at 15 miles again crossed the Hugh coming from the east, splendid gum-trees in it of every size. The pine is also here, the first we have met with. A splendid hole of water here, long and deep, with rushes growing round it, I think it is a spring; the water seems to come from below a large bed of conglomerate quartz. I should say it was permanent. A great number of black cockatoos and other birds; number of native-tracks all about. I hoped to have gained the top of the bluff to-day, which is still 7 or 8 miles off, and appears to be very rough. I expect a deal of difficulty in crossing it. I am forced to halt at this bend of the creek, in consequence of the little mare becoming so lame that she is unable to proceed further to-day. Our hands are very bad from being torn by the scrub, and the flies are a perfect torment. Indications of scurvy, too, are beginning to shew themselves upon us. Wind, west; cool night.

Thursday, April 12.—The Hugh. Started towards the Bluff on same course, 348°. At 8 miles again we struck the creek coming from the west, and a number of other gum-creeks coming from the range and joining it. We have now entered the lower hills of the range. Again have we travelled through a splendid country for grass. As we came towards the creek it became a little stony. At 12 miles we found a number of springs in the range. As we approach near the bluff our route becomes very difficult; we cannot get up the creeks for precipices. We are obliged to turn in every direction. In about 2 miles from where I obtained the observation we have with great difficulty arrived at the foot of the bluff, it has taken us all the afternoon; I expected to have gone to the top of it to-night, but it is too late. It will take half-a-day, it is so high and rough. We are camped at a good spring. Here I have found a very remarkable palm-tree; the leaves are 10 feet long, with small broad leaves, quarter-inch, growing from each side about 8 inches long and half-an-inch apart, coming to a sharp point, light green; they spread out like the top of the grass-tree. The fruit has a large kernel; hard shell like a nut, about the size of an egg; the inside tastes much like a coconut, but when roasted like a potatoe. Here we have also the India-rubber-tree, and several other new plants. This is the only real range that I have met since leaving the Flinders range. I have named it the MacDonnell range, after His Excellency the Governor-in-Chief of South Australia, as a token of gratitude for the many high and kind commendations he has conferred upon me at various times. The bluff I have named the Brinkley Bluff, after Captain Brinkley of Adelaide. The west one I have named Hanson Bluff, after the Honourable Richard Hanson of Adelaide. The range is composed of gneiss rock and quartz. The cork-tree we have also found.

Friday, April 13.—Brinkley Bluff, MacDonnell Range. At sunrise I ascended the bluff, it is the most difficult hill I have ever climbed. It took me 1½ hour before I reached the top. It is very high, and composed principally of igneous rock, with a little ironstone, much the same as the ranges down the country. On reaching the top I was disappointed, the view was not so good as I expected. In consequence of the morning being so very hazy, I could not see clearly the country before me. It has, however, enabled me to decide what course to take. To the south-west the Waterhouse and James ranges seem to join; at west-south-west they are lost sight of by one of the spurs of the MacDonnell range, and becoming lower, trending to the north of west. The course of the MacDonnell range is 10° north of west, and 10° south of east; to the north-west the view is hidden by another high point of this range, on which is a high peak that I have named Mount Hay, after the Honourable the Commissioner of Crown Lands. To the north about 5 miles are numerous small spurs of this range; beyond that there is apparently a

wooded or scrubby plain very extensive; and beyond that in the far distance is another range, broken apparently. A high conical hill bearing about west-north-west, to which I will go after getting through the range. To the north-east is the end of another range coming from the south. On this also is another high hill, which I have named the Strangways Range, after the Honourable the Attorney-General; beyond which there is a luminous, hazy appearance, as if it proceeded from a large body of water. A little more to the east there are three remarkable high mounts; the middle one is the highest, being bluff at both ends, and seems to be connected with Strangways Range. I should think it is upwards of 30 miles from this, bearing 60° . To the east is a complete mass of ranges, with the same luminous appearance behind them. I then descended the bluff, but had a terrible job in getting down; one false step and I should have been dashed to pieces in the abyss below; and thankful I was when I arrived safe at the foot. I find I have taken the wrong creek to get through the bluff. The Hugh still comes in that way, but more to the westward. Started at 10 o'clock, and arrived at the bluff at sundown, hills very bad to get over. Easterly winds; nights very cold; camped at the creek, which has an abundance of water, and apparently permanent from the number of rushes growing all about it. The feed splendid. A number of fresh native-tracks.

Saturday, April 14.—McDonnell Range. Started at 8 o'clock to follow the creek, as it seems to be the best way of getting through the other ranges; but as it comes too much from the east, I must leave it and get through at some of the low hills further down. Here at last, after a very severe struggle, we got through. It has taken us the whole day to come about 5 miles. We are now camped at a gorge north of the bluff, in which there is a good spring of water. The creeks now run north from the range.

Sunday, April 15.—The North Gorge of McDonnell Range. I ascended the high hill on the east side of the gorge; the atmosphere being much clearer, I shall have a better view of the country; to the north-west between the McDonnell Range and the conical hill, north-north-west, is a large plain, apparently scrub; no hills on the horizon, but a light shade in the far distance; the conical mount bears 340° , from this it appears to be high. To the north-north-east, between the conical mount range and the north-west point of Mount Strangways range, is another scrubby opening of the same description as the other. No hills in the far distance visible from the foot of this and the other ranges. For about 5 miles is an open grassy country with a few small patches of bushes; a number of gum-creeks coming from the ranges, and apparently emptying themselves in the plains. The bearing of Mount Strangways, $59^{\circ} 30'$; Mount Hay, 288° ; the country in the ranges is as fine a pastoral hill-country as a man would wish to possess, grass to the top of the hills, and abundance of water through the whole of the ranges. I forgot to mention the hut we got on the south side of the range is not fit to eat, it made both men very sick and caused violent vomiting; I ate one, but it had no bad effect on me.

Monday April 16.—The North Gorge of McDonnell Range. Started at 9 o'clock to cross the scrub for the distant high peak. For 5 miles the plain was open and well grassed, afterwards it became thick with munga-bushes and other scrubs, but still plenty of grass; course 340° . At about 20 miles we again encountered the spinifex, which continued until we camped. The scrub rather thick. Distance about 30 miles; met with no creek or water-course after leaving the McDonnell range; camped after dark without water.

Tuesday, April 17.—In the scrub. Got an early start and continued through the scrub and spinifex on the same course. At about 3 miles, passed a small stony hill about 2 miles to the west of our course. At about 18 miles saw to the west two prominent bluff-hills, and two or three small ones about 10 miles

distant from us. At about 32 miles crossed a strong rise; three reep-hook hills about 3 miles west, steep side facing the south. At sundown reached the hills; at 2 miles passed a small gum-creek, the only watercourse we had seen between the two range. Followed the range to the north-west till after dark in searching for a gum-creek coming from the range, but unsuccessfully: nothing but rocky and sandy watercourses. Camped—the poor horses again without water; trust that I shall find some for them in the morning, if not I shall have to return to the McDonnell range. Very little rain seems to have fallen here, the grass is all dried up; the spinifex does not cease until we get within a mile of the range; the small gum-creek that we passed is running south-west into the scrub, also the watercourses.

Wednesday, April 18.—Under the high peak Mount Freeling. At break of day sent Kekwick in search of water, while I ascended the high mount to see if any could be seen from this place. To my great delight I beheld a little in a creek on the other side of the range, bearing 113° , about $1\frac{1}{2}$ mile. I find this is not the highest point of the range; there is another hill still higher, about 15 miles further on, to the north-north-west. About 2 miles off I can see a gum-creek, looking very green, coming from the range in the direction I have sent Kekwick, where I hope he will find water. The country from the west to north-east is a mass of hills and broken ranges; to the west, apparently a dense scrub—no hills visible. To the south-west, high ranges, broken: to the north-north-east is another high hill, with a plain of scrub between; from 20 to 30 miles distant east, seemingly a deep scrub, no hills visible; south-east, scrub, tops of hills in the far distance. Brinkley Bluff bearing 166° ; camp, bearing 201° ; to the next high hill, 347° ; to high hill east of north, 26° ; to a high peak about 7 miles, 314° ; Mount Hay, 180° . Returned to my camp and find, to my great satisfaction, that Kekwick has discovered water in the creek about 2 miles off. I am very glad of it: I am certain that some of my horses would not have stood the journey back without it. I must not leave this range without endeavouring to find permanent water, as no rain seems to have fallen to the north of us; everything is so dry, you would think it was in the middle of summer. The sun also is very hot, but the nights and mornings are cool; wind south-east; old tracks and native camps about. The range is composed of the same description of rocks as the McDonnell ranges, with rather more quartz than mica. We here found new shrubs and flowers. Here is also a new pigeon, a small brown one, with a crest. On the peak I have built a small cone of stones, and named it Mount Freeling, after the Hon. Colonel Freeling, Surveyor-General; and the range, the Reynolds, after the Hon. the Treasurer.

Thursday, April 19.—Hugh Mount. The horses separated during the night, and were not found until after 1 o'clock. Moved to the east side of the mount, to where I had seen the water from its top; found plenty of water in gum-creek, which is the head of the one we crossed on Tuesday night, just before making the range. We were obliged to go a long way round before we could get to it, the hills being all sharp, rough rocks, impassable for horses: abundance of grass, with a little spinifex on the hills. At the camp I have marked a tree J. M. D. S.; the cone of stones on the top of the mount bears 293° . 10 miles distant, in a branch creek about half a mile to the north of this, is more water; and a little higher up, in a ledge of rocks, is a splendid reservoir of water, 30 yards diameter, about 100 yards in circumference. We could not get to the middle to try the depth: where we tried it it was 12 feet deep, and must be much deeper in the middle. A few yards higher up another ledge of rocks, behind which is another reservoir, but smaller, having a drainage into the other one. Native-tracks about. Wind north. I have named the reservoir Anna's, after Mr. James Chambers's youngest daughter.

Friday, April 20.—East side of Hugh, Mount Freeling. Started to the

south-east to find a crossing-place over the range, in which we had some difficulty from the roughness of the hills; at last got over it into the creek on the other side, which is at present running. To the north-east a large gum-creek, in which we have found water, and camped, having a second scrub to go through to-morrow before we get to the other hills. I think it will be best to give the horses a drink before we start, in case we should find none there. The range is well grassed, with gum-creeks coming from it, with a little mulga-scrub. Here we have discovered a new tree: the leaf has the shape of two wide prongs, dark-green seed or bean of a red colour, of which I have obtained a few; the foliage is very thick, growing high. The largest we have seen is about 18 inches through. The wood is soft; when in a state of a bush it has thorns on it like a rose-bush. Here we have also obtained some of the seed of the vegetable we have been using since the rain, which we find to be first-rate: it can be eaten as a salad, boiled as a vegetable, or cooked as a fruit—a most useful thing. We have also other seeds of new flowers. The bearing from this to the cone of stones on Mount Hugh $233^{\circ} 45'$.

Saturday, April 21.—Gum-creek, east side of Mount Freeling. Started at $7\frac{1}{2}$ across the scrub to another high hill: for 7 miles the scrub is open and beautifully grassed. At 12 miles from the camp we crossed another gum-creek coming from the range, which joins the other, as far as I can see running to the north-east. After 7 miles the scrub became much thicker; we had great difficulty in getting through from the quantity of dead timber, which has torn all our saddle-bags and clothes to pieces. There are a number of gum-trees, and the new tree that was found on Captain Sturt's expedition, 1844; the mulga predominates. At 14 miles we struck a large gum-plain on the east of our course, the scrub bounding it on the west side. We again have entered the scrub, and at about 22 miles met another arm of the gum-plains with large granite rocks nearly level with the surface, in which we found rain-water in the holes of the rocks. The gum-plain continued with small patches of scrub. At 32 miles crossed the sandy bed of a large gum-creek divided into a number of channels: too dark to see any water. 4 miles further on camped on a small gum-creek with a little rain-water; the creeks are running to the north-east. The soil is of a red sandy colour; the grass most abundant throughout the whole day's journey. Occasionally we met with a few hundred yards of spinifex. Wind south-east; days hot, nights cool. Native tracks quite fresh in the scrub-plain. We also passed several old wurlies.

Sunday, April 22.—Small Gum-creek under Mount Stuart. CENTRE OF AUSTRALIA. To-day I find from my observation of the sun, $111^{\circ} 30'$, that I am camped in the centre of Australia. I have marked a tree, and planted the British flag there. There is a high mount about $2\frac{1}{2}$ miles to the north-north-east which I hoped would have been in the centre; but on it to-morrow I will raise a cone of stones and plant the flag there, and name it Central Mount Stuart. We have been in search of permanent water to-day, but can find none. I hope from the top of Central Mount Stuart to find something good to the north-west. Wind south. Examined a large creek; can find no surface-water, but got some by scratching in the sand. It is a large creek divided into many channels, but all are filled with sand; splendid grass all round this camp.

Monday, April 23.—Centre. Took Kekwick and the flag and went to the top of the mount, but found it to be much higher and more difficult of ascent than I supposed it to be. After a deal of labour, slips, and knocks, we at last arrived at the top. It is quite as high as Mount Serle, if not higher. The view to the north is over a large plain of gums, mulga, and spinifex, with water-courses running through it. The large gum-creek we crossed winds round this hill in a north-east direction; at about 10 miles it is joined by another large creek, I should think the one we camped on the 20th. After

joining they take a course more north, and I lost sight of them in the far distant plain. No hills visible on the plains. To the north-north-east is apparently the termination of the hills; to the north-east, east, and south-east, broken ranges; and to the north-north-west seems to be the termination of ranges on the west side of plain; to the north-west broken ranges; to the west is a very high peak. Between it and this to the south-west are a great number of isolated hills. Built a large cone of stones, in the centre of which I placed a pole with the *BARRISU* FLAG nailed upon it. Also near the top of the cone I placed a small bottle, in which there is a slip of paper stating by whom it was raised, with our signatures to it. On finishing it we gave three hearty cheers for the flag, the emblem of civil and religious liberty. And may it be a sign to the natives that the dawn of liberty, civilization, and Christianity is about to break upon them. We can see no water from the top. Descended, but did not reach the camp till after dark. Found all right: this water still continues, which makes me think there must be more higher up the range. I have named it *John's Range* after my friend and well-wisher John Chambers, Esq., from whom I have received so many kindnesses and assistance in fitting out the different expeditions.

Tuesday, April 24.—Central Mount Stuart. Sent Kekwick in search of water, also to examine a hill that has the appearance of having a cone of stones upon it, while I made up my plan, and Ben mending the saddle-bags, which are in a sad mess from coming through the scrub. In the afternoon Kekwick returned, having found water higher up the creek, west. He has also found a new rose of a beautiful description, having a seed-vessel upon it resembling a gherkin, and a sweet strong perfume; thorns on the branches. The flower being withered, I am unable to describe it. The leaves are white. The native orange-tree abounds. Mount Stuart is composed of hard red sandstone, covered with *spinifex*, a little scrub on the top. In the two scrubs that we have come to the white ant abounds; and we have even found some of their habitations near the top of Mount Stuart.

Wednesday, April 25.—Central Mount Stuart. There is a hill about 2 miles to the west, having a remarkable small hill at the north end in the shape of a bottle; this I have named Mount Esther, at the request of the lady who made the flag. Started at 9 o'clock on a course little north of west to the high peak that I saw from the top of Mount Stuart, which bears 272°. My reason for going west is from what I could see from the top of the mount. I do not like the appearance of the country to the north for finding permanent water; it seems sandy. From the Peak I expect to find another stratum to take me up to the north-north-west. Around the mount, and on the west side, the country is well grassed; no stones; red sandy soil; a little mulga-scrub, in some places rather thick; all well grassed. A number of isolated hills on the north and south of our line composed principally of granite. At 10 miles there is a quartz reef on the north side of the south hills, running a little north of west. At 12 miles struck a gum-creek divided into three channels, coming from the south and running to the north. We found a little rain-water, and camped to enable us to finish the mending of the saddle-bags; beautiful grass abounds. Wind, east; very cold mornings and nights. The large creek that flowed round Mount Stuart I named the *Hanson*, after the Hon. R. Hanson.

Thursday, April 26.—Gum-creek on west course. Started at 84 on the same course to the high peak. At 2 miles crossed some low granite and quartz hills; at 4 miles crossed a gum-creek running to the north; sand and gravel-beds, no water. The country then became difficult to get through in consequence of the number of dead mulga-bushes; and at 10 miles the grass ceased, *spinifex* took its place, and continued to the banks of the next gum-creek, which we crossed at 22 miles; the bed sandy, divided into a

number of channels coming in from the south-east, and running a little to the east of north; no water; native-tracks in the bed. On the west side of the creek the grass again begins, and continues to the hills, where we arrived at five minutes to 7; camped without water. The country we came through to-day has been very grassy; there seems to have been very little rain here; the grass and everything else is quite dry. Distance 38 miles.

Friday, April 27.—East side of Mount Denison. Sent Kekwick to the south-west to a remarkable hill, which has the appearance of giving water, with orders to return if he should find any between, so that we might get some for the horses. I waited till after 12, but he had not returned. Obtained an observation of the sun. I then started, intending to go to the top of the mount. On getting to the north-east side of the ranges I liked the appearance of the country for water; and observing the top of the mount to be still some distance off, and that it would make it too late to return, I changed my intention. After one hour's search I was successful, finding it in a gum-creek coming from the hills and running a little east of north; rain-water. I observe the natives must have been here last night; their fires are still warm. Having left the camp and provisions with only one man, I hurried back, had the horses saddled and packed, and brought them down to the water, leaving a note for Kekwick to follow west-north-west to a gum-creek about 8 miles distant. He has found water that is permanent under the high peak to which I sent him. I have named it Mount Leichhardt, in memory of that unfortunate explorer whose fate is still a mystery. I have seen no track of his having passed to the westward. Kekwick describes the water to be abundant and beautifully clear, springing out of conglomerate rock much resembling marble. The water is still running, and likely to do so for some time. Its length is upwards of a quarter of a mile, falling into natural basins in the solid rock, some 6 feet in depth, and of considerable capacity. The country round the base of the range is covered with the most luxuriant grass and vegetation. Mount Leichhardt and the range are composed at the base of a soft conglomerate rock in immense irregular masses heaped one on the other; the higher part where the spring appears is of the same conglomerate, but broad and solid, having smooth faces, which makes the ascent very difficult. It continues so to the top of the mount.

Saturday, April 28.—Gum-creek under Mount Denison. As soon as the horses were got, I started to get up to the top of the mount. I left my horse in a small rocky gum-creek, thinking it would lead me to the foot of the mount. About a quarter of a mile from the mouth of the gorge, I came upon some water in a rocky hole, followed it up, and 200 yards further was stopped by a perpendicular precipice with water trickling over it into a large reservoir seemingly very deep. I had now to take to the hills, which were very rough. After a deal of difficulty we arrived at the top, but to my disappointment I had to go down a fearfully steep gully. At it I went, and again I arrived at the top, as I thought; but here again is another of the same gullies to cross, and the rise still higher. At last I have arrived at the summit, after a deal of labour and many scratches. This is certainly the highest mount I have yet been on; it has taken me full three hours to get to the summit, the view is very extensive, but not very encouraging. Central Mount Stuart bears 95° ; Mount Leichhardt $155^{\circ} 30'$. To the south, broken ranges with wooded plains before them; and in the far distance, scarcely visible, appears to be a very high mountain a long, long way off. To the south-west the same description of range, but the far distant one appears to be much higher. To the west-south-west a number of the ranges seem to terminate in the distance. About 30 miles is a high mount; to the west, open country with patches of woodlands. West-north-west same as last, with apparent high land in the distance. To the north-west seemingly an immense open plain, patches of wood; bearing to the next range, highest point 334° . To the north another plain, no hills visible.

To the north-east wooded plains; termination of Barkly range and hills, a little more to the north, in the far distance. As this is the highest mountain that I have seen in Central Australia, I have taken the liberty of naming it Mount Denison, after His Excellency Sir William Denison, K.C.B., Governor-General of Sydney. A mount on the next range, bearing 334° , being the last of the highest hills north, I have named Mount Barkly, after His Excellency Sir Henry Barkly, Governor-in-Chief of Victoria. When on the second highest point of this mount, I saw a native-smoke rise up in the creek below, a short distance from where I tied my horse; I could not go back, I already had too much difficulty in getting up that length to try it a second time. I have risked it. I have descended and find my horse all right. The natives have been in the creek and on the mount. Their tracks seem quite fresh, and they seem to have been running. The descent was difficult, but I found a shorter route, and it has taken me two hours to come down. Arrived at the camp at $4\frac{1}{2}$, and found all right; intended to have built a large cone of stones on the summit, but when I arrived there I was so exhausted that I could not do it; I have put a small one with a little paper below one of the stones, to shew that a white man has been there. I have also marked a tree, J. M. D. S., on the creek where we are now camped. Mount Denison bears from here 249° .

Sunday, April 29.—Gum-creek, under Mount Denison. Latitude, $21^{\circ} 48'$; variation, $3^{\circ} 20'$ N. Mount Denison and the surrounding hills are composed of a hard reddish-brown sandstone, very hard. About 100 yards from the summit is a course of a conglomerate, composed of stones from $\frac{1}{4}$ inch to 4 inches diameter, having the appearance of being rounded at a former period by water. From the foot to the top of the course is about 10 feet, and on the top about 12 feet broad, and red sandstone on the summit, with three or four pines growing. The mount and adjoining hill are covered with spinifex, but the plain is grassed; the wind has now changed to the west and is much hotter.

Monday, April 30.—Under Mount Denison. The wind changed again to the south-east during the night, and is again much colder; started on a course 315° across the plain, towards Mount Barkly; the plain in some places is grassy, but it is mostly spinifex; the higher point of the mount is distant from our camp on the creek, 18 miles; we had to round the west side of it; no water on that side, but found a little in the gorge coming from the higher point. It was dark before we arrived; could not take the horses up to-night; wind south-east, blowing a hurricane, and very cold; 20 miles to the top of the mount.

Tuesday, May 1.—North-west side of Mount Barkly. On examining the water I find it is only a drainage from the rocks. I ascended the hill, but could see nothing more than I had seen from Mount Denison; the base is composed of hard red sandstone, the top of quartz rock; there is only about two gallons of water to each horse. I hope we may find some to-day; I do not like the appearance of the country before us. Started on a course 335° , and at $6\frac{1}{2}$ miles came upon a large gum-creek, divided into numerous channels; searched it well, but could find no surface-water. In looking for it I discovered a native well in the east channel, close to a small hill of rocks, about 4 feet deep; cleared it, and watered the horses with a quart-pot, which took us long after dark. Each horse drank about 10 gallons, and some of them more. Natives have been here lately, and from the tracks they seem to be numerous. We also observed the rose-coloured cockatoo. I have named this creek the Fisher, after Sir James Hurtle Fisher; it runs a little east of north.

Wednesday, May 2.—The Fisher. Late before we can get a start in consequence of its taking a long time to water the horses; we started at 11 o'clock on the same course for some hills that I had seen from the top of the last two mounts; at 13 miles arrived at the hills, but found them low, and no appear-

ance of water; changed my course west 35° s. to some higher hills; at 6½ camped in the scrub, without water; the country from Mount Denison to this is a light red sandy soil, covered with spinifex, with very little grass, and is nearly a dead level. In some places it is scrubby, having a number of gum-trees, and the new tree of Captain Sturt, growing all over it. From a distance it has the appearance of a good country, and is very deceiving; you think you are coming upon a gum-creek every short distance; wind south-east; very cold at night and mornings.

Thursday, May 3.—Spinifex and Gum Plains. Started on the same course west, 35° s., and at 4 miles reached the top of the hills, which is low and composed of dark red sandstone and quartz; the bearing to Mount Denison, 146° ; Mount Barkly, 142° ; to another hill, 302° w.s.w., distant about 10 miles, which I have named Mount Turnbull, after the late Gavin Turnbull, Esq., surgeon in the Indian army. The morning is very hazy, and I cannot see distinctly; besides my eyes again being very bad. The appearance of the country all round is that of having gum-creeks; everywhere to the north there are some more low hills. A short distance off, on a bearing of 328° , there appears to be a gum-creek with something white, as if it were water, so that I will change my course. At 10 minutes to 4 camped: some of my horses being nearly done up from want of water, and having nothing to eat but spinifex; and it is the same to-night, no creek to be found. I have now come 18 miles, and the plain has the same appearance as when I first started: spinifex and gum-trees, with a little scrub occasionally. We are expecting every moment to come upon a gum-creek, but hope is disappointed. I have not so much as seen a water-course since I left the Fisher, and how far in this country it may continue so it is impossible to tell. I intended to have turned back sooner, but I was expecting every moment to meet with a creek; it is very alluring, and as apt to lead a party into a serious mistake. I am almost afraid that I have allowed myself to come too far; I am doubtful if all my horses will be able to get back to water, if this country continues; for it will be impossible to travel over it even in rainy weather. It will not retain water on the surface. We have not so much as passed a clay-pan of the smallest dimensions. The gum-trees on this plain have a smooth white bark; the leaves, some light green and some dark, and some have the appearance of being very healthy. There are a few dead ones about. To-morrow morning I must unwillingly retreat to water for my horses; there is no chance of getting to the north-west in this direction, unless this plain soon terminates, and from what I could see of it from the hill there is little hope for a long distance. I wish I could have found a creek with water; I cannot do impossibilities. I have done my best on this course.

Friday, May 4.—Gum and Spinifex Plains. At times this country is visited by blacks, but it must be seldom. We have only seen one track, which seems to come from the east and to return there. Since we left the Fisher the spinifex in many places has been burnt. The track of the native was very peculiar; not broad and flat, as they generally are, but long and narrow, with a deep hollow in the foot, the large toe projecting a great deal; the other in proportion, more like the point of a white man's than of a native's. Had I crossed it the day before I would have followed it. My horses are suffering too much from the want of water to allow me to do so now. If I were to do so, and not find water to-night, I should lose all my horses and our own lives in the bargain. I must now retreat to Mount Denison, which I do with great reluctance; it is losing so much time. My provisions are very limited. Started back 10 minutes past 7 o'clock, and at 30 miles came upon a native well; the bottom moist; also a little grass round in. Unsaddled and turned the horses out. Commenced cleaning out the well the best way we could, with a quart-pot and a small tin dish, having unfortunately lost our shovel in

crossing the McDonnell range. It is with great difficulty that we can keep the horses from getting into it, after cleaning it; to our great disappointment we found the water coming in very slowly. We can manage to get about 6 gallons in an hour and a half, which should be the allowance for each horse; it will take us till to-morrow morning before we shall get through with them. One of us requires to be constantly at them to keep them back, and that he can scarcely do; some of them will get away from him, do all he can. The horse that Kekwick has was nearly done up before we reached this place; also one of the others; those nearest the east-breed give in first.

Saturday, May 5.—Native Well. Got all the horses watered by 11 o'clock A.M.; could only get about 5 gallons for each horse; no sleep last night; it has taken us the whole of the night and morning to get through, which is very tiresome. Started for the Fisher, and arrived at the native well at sundown; was obliged to tie the horses up to keep them from getting into it. Some of them we could scarcely get this length, quite done up. Still worse, found the native well had fallen in since we left. It cannot be helped; must take things as they come. Commenced immediately to cut a number of stakes, rushes, and grass, to keep the sand back. By 3 o'clock in the morning we got them all watered, and very thankful we were so to do. It has been, and is still, bitter cold. Throughout the night and morning the wind still came from the south-east. We had a pot of tea, although we could ill afford it; laid down and got a little sleep; completely tired and worn out with hard work and want of sleep.

Sunday, May 6.—The Fisher. Got up at daybreak, had breakfast, then went to the well, but found the rascals of horses had been there before us and trod one side of the well in. They had as much water last night and morning as they could drink; the quantity that some of them drank was enormous. I had no idea a horse could hold so much. Still they want more. I shall remain here two days, and give them as much as they will drink. Put down more stakes, cleaned out the well again, and gave them as much as they could hold. During this trying time I have been much pleased with the conduct of Kekwick and Ben; they have exerted themselves to the utmost. Everything has been done with the greatest alacrity and cheerfulness; only having had two hours' sleep during these two nights, there was not a single word of dissatisfaction from either of them, which was, and is highly gratifying to me. It is a great pleasure to have men that will do their work without grumbling. Watered the horses as they came in. They do not now drink a fourth part what they did at first.

Monday, May 7.—The Fisher. Had a good night's rest. Feel recovered from the past fatigue. Again watered the horses, and started for the creek on the east side of Mount Denison, to the waters where we camped before; keeping the north side of Mount Barkly in search of water, but could find none. Arrived at the creek after dark; Kekwick's horse entirely done up; he had to get off and lead him 2 miles; another of them is nearly as bad, but we managed to get to the creek, found the water greatly reduced, but still enough for us.

Tuesday, May 8.—Creek east of Mount Denison. I must remain here two days to allow the done-up horses to recover; I am afraid, if we have another such a journey as the one we have just recovered from, I shall have to leave some of them behind. I do not know what is the cause of their giving in so soon; I have had horses that have suffered three times as much privation, and not give in. The light ones all right; it is the heavy ones which feel it most. I have been keeping them up on purpose for an occasion like this, and they all looked in first-rate condition; but the work of the past week has made a great alteration in some of them. I suppose the young grass is not strong enough yet for them. It is very vexing to be thus disappointed and delayed, to think

they should fail me at the very time I expected them to do their best, after all the trouble and loss of time I have incurred in giving them short days' journeys, with plenty of feed and water. I can make it no better by complaining, and therefore I must rest contented and hope for the better. Wind south-east, brewing storm.

Wednesday, May 9.—Creek east of Mount Denison. Resting horses and putting our things in order; wind blowing very strong from the south-east; the wind has continued nearly in the same quarter since March.

Thursday, May 10.—Creek east of Mount Denison. I find I must give the horses another day; they still look bad. I expect we shall have some more hard work for them. We have not quite finished mending.

Friday, May 11.—Creek east of Mount Denison. Ben was taken very ill during the night, and is still so bad that I am obliged to remain here yet another day. Afternoon: Ben feels much better. I shall start to-morrow.

Saturday, May 12.—Creek east of Mount Denison. Ben better. The horses look as if they can stand a little more hardship. Started twenty minutes past 8 o'clock, on a bearing of 21° east of north, to see if I could get to the north in that direction. For 14 miles our course was through mulga-scrub and spinifex, in some places very thick. Commenced again; the gum-flat and spinifex continued 4 miles, and there was mixed with mulga a little grass, in small patches. At 27 miles camped without water. The country that we have passed these two days is apparently destitute of water, even in rainy weather; I do not think the ground would retain the water a single day. Very little feed for the horses.

Sunday, May 13.—Scrub and Gum-flat. The appearance of the country I do not like. I can see no hope of obtaining water on this course; I shall therefore change to the east, in order to cut the large gum-creek that I crossed on the 26th ultimo, and follow it out wherever it goes, that is, if I find water in it. At 3 miles cut a small gum-creek. Searched for water, both up and down, but could find none; no appearance of it. Still keeping my east course, we then passed through a very thick mulga-scrub, and at 10 miles struck a low range of hills, composed of quartz, and which has a conical peak, which I ascended. The prospect from this is very disheartening; the view is extensive, apparently the same sort of scrubby country that I have endeavoured to break through to the north-west. Distal to the north. There are a few isolated hills, seemingly the termination of the John Range, and of the same formation as this that I am now on. To the east, gum-flats and spinifex; to east-south-east, there is the appearance of a creek, to which I shall now go. At 3 miles, what I supposed to be the creek I am in search of is a small narrow gum-flat, which receives the drainage from this low range, in which we found a hole where there had been water; it is, however, now all gone. *The peak I have named Mount Rennie, after Major Rennie of the Indian army. In this small flat we shot a new macaw, which I shall carry with me, and preserve the skin, if we get to water to-night. The bird under the wings and front part of the neck is of a beautiful crimson colour, the back a light lead-colour, and smaller than a cockatoo; the crest the same as macaws. After leaving the flat we passed through some scrub, and came upon another of the same description. Here I narrowly escaped being killed. My attention being engaged looking for water, my horse took fright at a wallaby, rushed into some scrub, which pulled me from my saddle. My foot and the staff that I carry for placing my compass on caught in the stirrup-iron. Finding that he was dragging me, he commenced kicking at a fearful rate. He struck me on the shoulder-joint, knocked my hat off, and grazed my forehead. I soon got clear again, but found the kick on the shoulder very painful. Mounted again, and 7 miles we have come upon some more low hills, with another prominent peak, of a dark-red sandstone. This I have named Mount Peake, after E. J.

Peake, Esq. I now find the gum-creek that I crossed between Central Mount Stuart and Mount Denison, runs out, and forms the gum-plains; those just passed. No hope for water; I must now bear in for the centre again, to get water. Passed through a very thick, nasty, mulga-scrub, 5 miles, and camped under some low stony hills; again without water. Feel the effects of my accident very much.

Monday, May 14.—Stony Hills, mulga-scrub. Feel very stiff and ill. At daylight started for the waters, and at 30 miles passed through three belts of mulga-scrub, very thick, and difficult to get to them, between which there are low stony hills. At 3 miles passed a small gum-creek, emptying itself into the scrub, and at 17 miles passed another, doing the same. At 20 miles another, and at 24 miles another, under the hills north-west of Central Mount Stuart, which has a very remarkable hill at the north-west, in the shape of a very large bottle with a long neck. It has been with the greatest difficulty that we have been able to get all our horses to the water. Three of them are very bad; two of them have been down a dozen times during the journey to-day. On approaching the range we passed through some patches that are large; kangaroo-grass growing very thick, and reached to my shoulders when in the saddle.

Tuesday, May 15.—Centre. The horses look very bad to-day; I shall require to give them three or four days before I can start again; it is very vexing, but it cannot be helped; the water will last about ten days. I will cause another search to be made for more; I am unable to do so myself, in consequence of being very unwell. Yesterday I was riding in the greatest pain, and it was with great difficulty that I was able to sit in the saddle until we reached here, from the effects of my fall, combined with the scurvy, which has taken a very serious hold of me. My hands are in one mass of sores, that will not heal up, do all that I can. In remaining at a place for two or three days where I can get them well washed, they are much better. If I am a day without they are worse than ever; I am nearly helpless with them. My mouth and gums are now so bad that I am obliged to eat boiled flour and water. The pains in my limbs and muscles are almost insufferable. I hope that once it gets to a head, it will soon leave me. Kekwick is also suffering from bad hands, but as yet no other symptoms. I really hope and trust that it will not be the cause of my having to turn back. I suffered dreadfully during the past night. This afternoon the wind has changed to the west—the first time since March; a few clouds are coming up in that direction.

Wednesday, May 16.—Centre. As the day broke I had despatched Kekwick in search of permanent water, with orders to devote the whole of two days for that purpose. I must now do everything in my power to break this barrier that prevents me from getting to the north. If I can only get 120 miles from this, I think there would be a chance of getting to the coast. I wish the horses could endure the want of water a day or two longer, but I fear they cannot. This last journey has tried them to their uttermost. Had I been another day, I should have lost the half of them; two of them still look wretched to-day, and will with difficulty get over it; one I can scarcely think will do so. With five of them I should not have been afraid to have risked two more days. I wish they had been all alike; had they been, I should have tried a degree and back again without water, to the north-west. For the last three weeks I have been suffering dreadfully from pains in the muscles, caused by the scurvy; but the last two nights have been most excruciating, from head to foot occasional violent pains darting through my body. It is nearly beyond endurance; so much so, that last night I almost wished that death would come and relieve me from my fearful torture. I cannot endure many nights such as the last. I am so very weak that I must with patience abide my time, and wait for the Almighty's interposition in my behalf. This morning I feel

a little easier. The medicines I brought with me are all bad, and of no effect. The wind still from the north-west, with a few light clouds. Towards sundown the wind changed to the south-west, heavy clouds coming from the north-west.

Thursday, May 17.—Centre. Wind from the south; the heavy clouds continued until sunrise, then cleared off. I was in full expectation of having some rain, but am disappointed. I have again got through another dreadful night of suffering; I had about two hours' sleep, which was a great thing; the only sleep in the last three nights. This morning I observe the muscles of my limbs are changing from the yellow-green colour to a black. My mouth is getting it. It is with difficulty that I can swallow anything. I am determined not to give in to it; I shall move about as long as I am able. I only wish the horses had been all right, I would not have been so long here. Three o'clock, Kekwick has returned, and reports having found water in the Hanson, about 15 miles from Central Mount Stuart; only a small supply, however. Beyond this the creek divides into two, one running north, the other east, but he could see no more water further down. He also saw two natives, armed with long spears, at about 200 yards distant. They did not observe him; he thought it most prudent not to show himself, but remain behind a thick bush until they were gone. In this instance I regret his being so prudent, for I am anxious to see or hear what the appearance of the central natives is. Wind variable, with heavy clouds from the north-west.

Friday, May 18.—Centre. I have again had a very bad night, and feel unable to move to-day. Wind the same.

Saturday, May 19.—Centre. I had a few hours' sleep last night, which has been a great benefit to me. I shall attempt to move down to the water in the Hanson. Arrived at the water about half-past 1, completely done up from the motion of the horse. The water is a few inches below the surface in the sand. East side Mount Stuart, bearing 250° , about 10 miles distant. I do not think the water is permanent.

Sunday, May 20.—The Hanson. Another dreadful night for me. Wind and clouds still come in from the north-west, but no rain.

Monday, May 21.—The Hanson. Unable to move; very ill indeed. When shall I get relief from this dreadful state?

Tuesday, May 22.—The Hanson. I got a little sleep last night, and feel a great deal easier this morning, and shall try horseback again. I shall now steer north-east, to a range of hills that I saw from the top of Central Mount Stuart, and hope from these to obtain an entrance to the north-west or north-east; I am also in the hope of cutting the creek that carries off the surplus-water from all the creeks that I have passed. It must go somewhere. One would hardly think the immense bodies of waters that I have passed since March last can be consumed by evaporation. Started on a course of 48° , crossed the Hanson, running a little on our right; at 6 miles crossed it again, running more to the north for 2 miles further. We crossed other four of its courses, all running in the same direction. The easternmost one is spread over a large salt-creek valley, and forms a lagoon at the foot of some sand-ridges. The higher one is $10\frac{1}{2}$ miles from last camp. On the east side of it there is a large lagoon, 5 miles long by $1\frac{1}{4}$ mile broad. Water has been in it lately, but it is now dry. We then proceeded through a little scrub, splendid grass, and at 12 miles cut a small gum-creek, coming from the ranges. A number of birds about; tracks of natives quite fresh in the creek. Sent Kekwick down it to see if there was water, while I went up and examined round about. This is the large gum-plain we met the day we made the centre. It is completely covered with grass. Kekwick ran the creek out in about 2 miles. He passed a little water in the creek where the natives had been digging; he also came upon two of them and two little children, they did not observe him.

until he was within 50 yards. They stood a few minutes paralyzed with astonishment; then, watching up the children, ran off as quick as their legs could carry them. They did not utter a sound, although he called to them; he observed they had no hair on their heads, or as short as if it were burned off close. I wish I had seen them; I could have overtaken them, and seen if it were a fact that the hair was burnt. That is the sign—as reported in Adelaide—of natives being in the interior without hair on their bodies. At 14 miles we again struck the creek, with plenty of water. It winds all over the plains in every direction. Camped for the night, very much done up; could scarcely sit the saddle this short distance. Wind, north-west.

Wednesday, May 23.—Gum-creek, east range, the Stirling. Wind has again changed to the south-east; this creek I have named the Stirling, after the Hon. Edward Stirling, M.L.C. Followed it into the range on the same course towards a bluff, where I think I shall have an easy crossing. At 1 mile from the camp the hills commence on the south-east side of the creek, but on the north-west side they commence 3 miles further back; in the creek there is abundance of water all the way for 13 miles, at 10 miles there is another large branch, with water coming from the south-east. At 14 miles ascended the bluff, and obtained the following bearings. To a high part of range on the south side of the creek, which I have named Mount Gwynne, after his Honour Justice Gwynne, 186°, about 2 miles distant; to another hill on the north side, 249°, at about 2½ miles distant, which I have named Mount Mann, in memory of the late Commissioner of Insolvency; Central Mount Stuart bears 131° to the highest point. At the north-west termination of next range, for which I shall now go, there appear to be two very large hills; the north one the highest, which I have named Mount Strzelecki, after Count Strzelecki, bearing 355° to another high peak on the same range, which I have named Mount Morphett, after the Hon. John Morphett, M.L.C. The view from this bluff is extensive, except to the west-north-west which is hidden by this range, which I have named Forster Range, after the Hon. Anthony Forster, M.L.C. From the south-west it has the appearance of a long continuous range, but on entering it it is very much broken into irregular and rugged hills; on this side the north-east it is table-hills, with a number of rugged isolated ones on the north side. To the north-west there is another scrubby and gum-tree plain, no hills visible in the far-distance; to the north-north-west are some isolated low ranges; to the north are grassy plains and low ranges; to the east are a number of spurs from this range. This range is composed of a very hard red stone, mixed with some small round quartz and ironstone, in some places a hard flinty quartz; the range and hills are covered with spinifex, but the valleys are beautifully covered with grass. Descended and crossed a most beautifully grassed country. At 4 miles struck a creek coming from the range, passing through between two low ranges and running towards the north-east. At 7 miles changed my course to north-east to camp in the creek and endeavour to get water for the horses before encountering the scrubby plains to-morrow morning. At 5 miles came upon a low range, but no creek, it must have gone further eastward. It being now quite dark, camped under the ranges. Since I changed my course I have come through a patch of mulga and other scrubs with plenty of grass, but no water-courses. Wind, south-east; heavy clouds from the north-west, lightning in the south and west.

Thursday, May 24.—Range of low hills. This morning I feel very ill, from climbing the bluff yesterday. No sleep during the night, the pains being so very violent. About 9 o'clock we had a heavy shower of rain, and a few more during the night. Still very black, and threatens more; very late before the horses were found, and the atmosphere very thick, with the prospect of rain for the rest of the day; and, my being so ill, I have decided upon remaining

here until to-morrow, there being sufficient rain-water for the horses. A few more light showers during the afternoon and evening. Wind, still the same; heavy clouds from the north-west.

Friday, May 25.—Range of low hills. Feel better this morning. Clouds all cleared off during the night, and it is now quite fair. Started for Mount Strzelecki, passing through some very thick mulga-scrub with a few gum-trees, plenty of grass, and at 21 miles came upon a small gum-creek coming from the range. Gave the horses water, filled our own canteens, and proceeded to the foot of the mount, and camped; within a mile of its base the spinifex begins again. Wind, south-east; very cold.

Saturday, May 26.—Mount Strzelecki. Camped; very heavy clouds from the north-west. The mount is about 4 miles distant; at sundown it commenced to rain and continued about 1 hour. A beautiful rain. It is very strange the clouds come from the north-west and the wind from the south-east; the raining weather seems to be coming against the wind.

Sunday, May 27.—Lagoon, north-east of Mount Strzelecki. We had a few heavy showers during the night, and it seems as if it would clear off, which I hope not, for we have not yet had enough. There is only about 2 inches of water in the lagoon. Again I feel the pains very bad from climbing to the top of Mount Strzelecki, and assisting in building the cone of stones. If I did not put my hands almost to everything that is required, I should never get on; my party is too small; it is terribly killing work.

Monday, May 28.—Lagoon, north-east Mount Strzelecki. Could not get a start till a quarter past 9 o'clock, the horses having gone to a distant bank for shelter from the wind, which is piercingly cold. At first I had to go 3 miles north-north-west, in order to clear the low stony range that runs on to east side of lagoon; I then changed to 22° to the far-distant range; the first 3 miles on this course was through a very thick mulga-scrub, with plenty of grass and occasionally a little spinifex. It then changed to slightly undulating country, of a reddish soil; gum-trees, spinifex, and now and then a little thick scrub mixed with cork-tree; and often numerous, low, sandy plains, much resembling the gum and spinifex to the west, where I was beaten back twice; only varied by a little more of the low scrub and undulating country, which gives me hope of it soon ceasing: it certainly is a desert country, no water. Camped, without water, on a little patch of grass. Distance made to-day 23 miles. Wind, south-east; very cold, been so all day.

Tuesday, May 29.—Scrub, Spinifex, and Gum-trees. Started at eight o'clock, on the same course, for the range, which is still distant, through the same description of country. At 7 miles we came upon a plain of long grass, which has seemingly been flooded; most likely where a creek empties itself into the plain, about 2 miles broad. Between this and the first hill of the range we passed four more plains of the same description to the first hill, 14 miles. In another mile we struck a small creek, searched for water, but could find none, although there is a number of birds; thence through another mulga-scrub, and, after crossing a number of rough stony hills, we arrived at the top of the range, which I have named the Davenport Range, after the Hon. Samuel Davenport, M.L.C. It is composed of hard red sandstone, with courses of quartz. I find this is not the range to which I am coming; although this one is high, the other one is still higher, and I should think is still 40 to 50 miles distant. The day is thick; I cannot see distinctly. Between there is a large plain, more open than those we have come over. To the north is apparently the termination of the range. To the west of north, in the far distance, just visible, are apparently high hills: the northernmost is conical. To the east and south-east is the plain and range; to the west, continuation of the same plain that we have come over in the last two days' journey. Although we had some heavy showers at the lagoon, we have not passed a single watercourse, except

the one we crossed a few miles before we made this range, nor did we see a drop of surface-water; it seems to be all absorbed the moment that it falls. Descended the north-north-east side of the range, and at $1\frac{1}{2}$ mile found some rain-water in a creek coming from the range. Camped. Wind, south-east. 20 miles.

Wednesday, May 30.—The Davenport Range. I find this water will not last above three days. I have determined to remain here to-day, and have sent Kekwick in search of more water. As my hands now are a little better, I must get my plan drawn up, which is a long way behind; in consequence of their being so bad with the scurvy, I have been unable to do anything to it for a long time. The pains in my limbs are much easier, yet the riding is very severe; my mouth is also much better, which gives me hopes of it leaving me soon. Native-tracks about here. From the top of the range I saw smoke in the scrub, a few miles to the north-west. Sundown; I am quite surprised that Kekwick has not returned, as my instruction to him was not to go above 5 or 6 miles, and then to return, whether he found it or not, as I liked the appearance of the plain before us for water. There seem to be some creeks. I am very much afraid that something has happened to him; I feel very uneasy about him.

Thursday, May 31.—The Davenport Range. Kekwick has not returned; I hope that nothing has happened to him. I must be off, and follow up his tracks. Sent then for the horses; long time in finding; generally the case when one wants a thing in a hurry, not to be found. Half-past 9 o'clock, Kekwick has arrived before the horses; he overshot his mark last night, and got beyond the camp. I am very glad he is all safe. Informs me that he came upon plenty of water a few miles from here, which compensates for the anxiety he caused me during the night. His reason for not returning as I had directed, was his crossing a gum-creek which had a very promising appearance, which induced him to follow it to the plains, where he found an abundance of water. While riding, too, he was taken very ill, and consequently was unable to come on for some time, which made it so late. He was unable to go to-day, which is vexing, as I wish to get on as quick as possible. Course of range east and west.

Friday, June 1.—The Murchison Range. Horses a distance off; do not get a start till late. Started on a course of 22° , and at 2 miles a small gum-creek, coming from the range, and running west-north-west. At $3\frac{1}{2}$ miles crossed a larger one, coming from, and running in, the same direction. Then commenced again the same sort of country, except some low stony rivers that we passed the other day; and at 8 miles struck a splendid large gum-creek, or river, having long and deep reaches of water, with fish four or five inches long. It is running through the plain as far as I can see, which is but a short distance, being level, low ground. Its course at this place is to the west-north-west; it is very broad, and in some places the banks are perpendicular from bank to bank; its width about 10 chains, well grassed on the banks, with fine gum-trees, mulga, and other bushes. This is as fine a creek for water as we have passed since leaving Chambers Creek. It being far advanced in the day I shall camp here, and get to the range to-morrow. I am very much inclined to follow this creek, and see where it empties itself. I expect to find a large one next the range, or on the other side. I wish to get on the top, to see what the country is like in advance. Fish being in this creek, leads me to think that it must empty itself either at the north-west coast, or into a lake. I can hardly suppose it can empty itself into the gum-plains, like the other lately passed, and fish in it. I have named it the Bonney Creek, after Charles Bonney, Esq., late Commissioner of Crown Lands for South Australia.

Saturday, June 2.—The Bonney Creek. Started at twenty minutes past 8 o'clock on same course, 22° , for the range, through a country of alter-

rate spinifex and grass, with a little mulga-scrub; a deal of grass mixed with the spinifex for 7 miles, when we struck another large gum-creek, with every appearance of water. I had no time to look for it, being anxious to make the range to-night, and endeavour to find water, either on this side or the other. The creek is large, and resembles the other; I have named it the McLaren, after John McLaren, Esq., late Deputy Surveyor-General of South Australia. We have passed through a good grassed country, with a little scrub; and at 17 miles we reached the top of the first range, which is composed of a hard white granite-looking rock, with courses of quartz running through it. I have got three or four spurs to cross yet before I make the main range. The creek—McLaren Creek—that we crossed to-day, is running much in the same direction as the Bonney Creek, as far as I could see. Started from the top of the range, had a very difficult job in crossing the spurs. About sundown arrived all safe on a gum-flat between the ranges; attempted to get upon what appears to be the highest range, but we were deterred from getting the horses up. We then sought for water among the numerous gum-creeks which cover the plain, and at dark found some, and camped. There is a good supply of water. I do not think it is permanent; it will last a month or six weeks. Wind, varying.

Sunday, June 3.—Murchison Range. Feel very unwell this morning, from the rough ride yesterday. It was my intention to have walked to the top of the range to-day; I am not able to do so. The small plain between us and the ranges is a bed of soft white sandstone, through which the different creeks have cut deep courses; the stones on the surface, igneous principally, composed of iron, quartz, dark black and blue stone; also a bright red one, all run together and twisted into every sort of nick, as also with the limestone, and many other sorts of which I do not know. This plain is covered with most hard spinifex; very difficult to get the horses to face it. There is a little grass in the creeks. In another creek, about 1 mile south-west from the camp, is a large water-hole, 10 yards long, by 20 yards wide, which will last six months. I have named these ranges the Murchison, after Sir Roderick Murchison, President of the Royal Geographical Society, London.

Monday, June 4.—The Murchison Range. Started on a course of 330° to round this spur of the ranges, and at $4\frac{1}{2}$ miles changed to 15° , to high point of the range, and at 3 miles arrived on the top, which I have named Mount Figg; from this the view is extensive. The course of this range from the south to this point is 25° ; it then makes a turn to the north-north-west. In that direction the country appears more open, with some patches of thick scrub, with high ranges in the distance. From north-west to west it appears to be gum-plain, with open patches, seemingly grass; a number of creeks running into it from the range. Some low hills about 10 miles distant, on a low range which is running to the north-west. I shall change my course to a high peak on the north-west point of the range, which bears from this $340^{\circ} 30'$. This range is volcanic here; it is in the same formation I have already given. Started from the top of Mount Blyth; at 12 o'clock went along the side of the range 8 miles, met with a small gum-creek running our course; followed it up for 3 miles; no water. It then took a more westerly course; I therefore left it, taking my own course. After leaving the mount, the range is composed of red sandstone, with a few quartz. Camped at 6 o'clock, without water; did not meet with a creek or water since leaving the one coming from the ranges. The country from that is red sandy soil, well grassed, having now and then to go through a little spinifex, with grass mixed with it, gum-trees, mulga, cork-tree, mally, and numerous other scrubs, none of them very thick; occasionally met with a little ironstone gravel.

Tuesday, June 5.—Gum-tree and plain. Started at 7 o'clock for the high

peak: same course through the same sort of country as yesterday; no water-course. At 15 miles ascended the peak, which I have named Mount Samuel, after my brother. The top is a mass of nearly pure ironstone; it attracted the compass 180° . From north to west are a number of broken ranges and isolated hills in all sorts of shapes; volcanic; no high distant hills visible. The isolated hills seemed to be the termination of these ranges, which appear to be running nearly north and south. I have named it McDoull Range after Colonel McDoull of the 2nd Life Guards, Logan, Wigtownshire. I then changed my course to the north-north-east in search of water, there being no appearance of any to the north-north-west. After travelling 5 miles over grassy, scrubby plains, small between isolated hill and gum-trees, I could not find a water-course: changed to the east to see if I could see anything from a high hill which I ascended, and can see a gum-creek coming from the range on the east side; followed it down, and $1\frac{1}{2}$ mile from the top found a splendid hole of water in the rock, very deep, and permanent: the creek is very rocky, and its course here is north-east into the plain. Wind south-east; clouds from the north-west.

Wednesday, June 6.—Gum-creek, north-east side of the McDoull Range. There being nothing but spinifex on the ranges and creeks, the horses have been travelling nearly all night in search of food, and had gone a long way before they were overtaken. This morning saddled and got a start by 11 o'clock on a course 340° , after crossing numerous creeks and stout spinifex, through which we had great difficulty in driving the horses, and at 5 miles struck a gum-creek in which we found water: the banks have excellent feed upon them, and in abundance. It being so late when we started, the horses having little food last night, and apparently a thick scrub to encounter, with no distant hills in view, and might be without water for 3 days, I have determined to remain here to-day and give them the advantage of the feed, so they may be able to undergo a push. At this place the creek is running east. Ben is searching for the horses this morning; found three or four more large water-holes in the adjoining creek. A little south-east from this there appears to be an abundance of water in the ranges. Before we reached this we crossed some marks very much resembling an old horse-track: this I have named Tennant Creek, after John Tennant, Esq., of Port Lincoln.

Thursday, June 7.—Tennant Creek, McDoull Range. Started at 20 minutes past 7 o'clock, course 340° . At 3 miles passed through an immense number of huge granite rocks, piled together and scattered about in every direction, with a few small water-courses running amongst them to the eastward; we then encountered rather a thick scrub, and occasionally crossed a few low quartz rises coming from the McDoull range, grass and spinifex, with gum-trees; and at 14 miles ascended the highest of them. To the north-west and north is another range about 10 miles distant, seeming to continue a long way. I will change my course to 315° , that being the highest point; and have named it Mount Woodcock, after the Venerable Archdeacon of Adelaide. At 2 miles on this course came upon a gum-creek running to the north-east; followed it up about $1\frac{1}{2}$ mile, and found water which will last a month or 6 weeks: an immense number of birds. Natives' camping-place; they seem to have been here very lately. Watered the horses, and proceeded towards the range. At about 2 miles passed a low ironstone range, rugged, being peculiar in having a large square mass of ironstone standing by itself about the centre. I have named it Mount Sinclair, after James Sinclair, Esq., Port Lincoln: passing through thick scrub, in which we saw a new one having a blue-green leaf, upwards of 10 inches long by 6 inches broad, a very handsome bush; looked for some seed, but could find none. At 5 miles crossed a gum, grassy plain where a creek empties; the same scrub again continues to the range where we arrived. At 12 miles from the water it is not very high, but

very rough and steep, and we had great difficulty in getting to the top; but after many twistings, and turnings, and scramblings arrived there all right, and found it to be table-land, and at 14 miles camped without water. The ranges are composed of ironstone, granite, quartz, and red sandstone running north of west and south of east; I have named it Short Range, after the Right Rev. the Lord Bishop of Adelaide.

Friday, June 8.—Short Range. Started at 8 o'clock on the same course, 315°, to some very distant rising grounds. Short range seems to run nearly parallel to our course; also another distant range to the north, which I have named Sturt Range, after Captain Sturt. The table-land continued about 2 miles, and then a gradual descent to the plains, and entered a thick scrub with spinifex and gums; and at 18 miles came upon a beautiful plain of grass having large gum-trees—a new description of tree—the foliage is very dark-green and rather round, having a rough, dark-coloured bark; also the cork-tree and numerous other shrubs. This grassy plain continued until we camped at 31 miles, but the last part is not so good. We are now getting into spinifex and lighter sandy soil; the thick scrub is beginning again. When I struck this plain I was in great hopes of finding a large creek of water, but such is not the case. We have not crossed a single water-course in 31 miles. Camped at sundown. No water. Wind south-east.

Saturday, June 9.—Grassy Plains. There is some rising-ground a few miles further on to which I shall go in search of a creek. I might be able to see something from it: if not, I shall require to retreat to Bishop Creek for water, the horses having now been two nights without. Started at 7 o'clock, same course, 315°, through scrub and light sandy soil. At 4 miles got to the rise, which is a scrubby sand-hill: from this I can see nothing, the scrub is so thick, about 12 feet high, a nasty, tough, wiry description, which has torn our hands and saddle-bags to pieces. I got up a tree to see over the top of it. I can see a long distance in our course; it appears to be the same terrible scrub. No appearance of any creeks. I must endeavour to find water. It is very vexing to have got thus far and have to turn back again, when perhaps another day's journey would bring me to a better country. I shall now try a south course, and cut the grassy plain to the westward in the hope of finding a creek or water in it, which I trust I may; if so, I will get 2 days' journey to the north-west. Started on a course south through scrub and small grassy plain alternately, and at 14 miles came upon the large one; but no creek nor water can we find, although it is not long ago since the natives have been here: they must obtain their supply of water from wells, which we cannot find, although we have searched all the places where they had camped lately. I find that some of my horses are getting dull; I must, therefore, strike in for my outward track to enliven them up a bit; there is no hope of finding water here. Turned to the east-south-east, and at 4 miles one of the pack-horses took it into his head to have a game to himself, went off at full speed, kicking up his heels at a fine rate; ran against a tree, broke the saddle, tore the bags, and split the flour, which is the worst of all, we being already so short. Here we were obliged to stop 3 hours repairing, and gathering up the flour. We cannot afford to lose a particle of it; the last part we had to collect sand and everything with it, and endeavour to separate the one from the other by water when we get there. Got all to rights, and started again; one horse giving in very fast. A little before sundown came upon a little green grass, which I thought might do them good; the scrub and spinifex being again before us, where there is no feed. I camped for the night, seeing the state my horses were in for the want of water. I now regret that I attempted the south course, which makes the distance from the water so much greater. I fully expected to have met with water in the grassy plains: to-morrow I hope we will meet with more success.

Wind still south-east; heavy clouds coming from the north-west. I trust it will rain before morning.

Sunday, June 10.—Grassy Plains. At sun-rise started, and at 2 miles again getting into the scrub. Three of the horses we scarcely can get on; they are very much done up. At 11 o'clock one horse has given in altogether; we cannot get him up. We have tried everything in our power to do something for him. The other horses have been carrying his load; he has been going without anything to carry the last hour and a half; it will not do; he has fallen down, and we cannot get him up. We have assisted to help him up, but he is no sooner up than down again. Though with great reluctance, I am obliged to leave him to his fate; had this occurred nearer the water I should have put an end to his existence, and taken part of him to eat, for we are now very short of provisions, and the other horses have quite enough to carry without any from him; I wished I had left him sooner. At 12 o'clock I find that I shall lose some more of them if they do not get water to-night. It will be to-morrow before I can reach Bishop Creek. I will now go into Short Range and try to find some water; for the little bay mare has become nearly mad, running about among the other horses, and kicking every one as she passes. Even the men do not escape from her heels. At 5 miles made the range; there are no large creeks coming from this side; nothing but small ones, which empty themselves into the plain; sand up to the foot of the hills before we reach the range. Another of the horses done up; we have taken his load off; he has been only carrying about 30 lbs. in consequence of his back being bad these three weeks, and we put it on the others. We lightened all the weak horses two days since. We shall now try if he will go without anything on his back. We are now amongst the granite ridges; I hope we shall find water on this side. The horse has given in; before we can get to the other side we must leave him for the sake of the others; too much time already has been lost in endeavouring to get them on the other side. Searched the different creeks, but cannot find any water; crossed a spur of the range running south, and can see a nice-looking creek with gum-trees. Hopes and spirits are again revived; even the sight of it has revived the horses, who are hurrying on towards it. Traversed it down, but to our great disappointment found it lost itself in a grassy plain; it is now dark; I must remain here for the night. The sky is quite overcast with heavy clouds. I trust that Providence will send us rain before morning. An accident has happened to the water we were carrying; that was all gone yesterday. If it clears during the night, so that I can see the stars to guide me by, I shall move on during the night if it does not rain.

Monday, June 11.—Short Range. During the night there were a few drops of rain, which again enlivened us with the hope of more; about 4 o'clock it looked as if we were to have a deluge, but alas! it only lasted about two minutes. As much fell as would just wet a pocket-handkerchief. Saddled up and started through the range; my poor little mare looking very bad this morning. I have taken everything off her to try to get her to water, and have been obliged to leave as many things at this camp as I could possibly do without, which I will feel the want of; the mare lying down at every few yards, must leave her for the sake of the others; left her in the ranges. From the number of birds that are about here I think there must be water close handy, which I hope she will find, although I am afraid she is too far gone ever to try it. At 1 o'clock, at the foot of Mount Woodcock, horses' spirits revived at sight of the track. I shall now be able to get all the rest of them safe to water, although there is one still doubtful. My own black mare shows a few symptoms of madness, but still keeps on and does her work well. About an hour before sundown arrived at the water without any more losses, for which I sincerely thank the Almighty. We have had a terrible job to keep

the horses from drinking too much water; they have taken a few mouthfuls of grass. I have allowed them to take as much as they think proper; the natives have been here since we left.

Tuesday, June 12.—Bishop Creek. Resting horses; they look very bad; remained by the water all night.

Wednesday, June 13.—Bishop Creek. The horses still look very bad this morning; they have stopped alongside of the water nearly all night; they had been 101 hours without a drop of water, and have accomplished a journey of 112 miles; they will require a week to recover again; one of them is very lame from a kick the little mare gave him in her madness. Thus ends my last attempt at present to make the Victoria river. Three times have I tried it, and have been forced to retreat. About 11 o'clock I heard the voice of a native; looked round, and could see two in the scrub about a quarter of a mile distant. I beckoned them to approach; they were making signs; I could not understand them; I then moved towards them. The moment they saw me move they ran off immediately; some quarter of an hour afterwards they again made their appearance on the top of the quartz-reef, opposite our camp, and two others showed themselves about the same place where the two first did; thinking this was the only water, I made signs to the two on the reef to go to the water. Still they continued talking, and making signs which I could not understand. It seemed as if they wished us to go away, which I was determined not to do. They then made a number of frantic gestures, shaking their spears and twirling them round their heads, and a number of others; I suppose bidding us defiance; the youngest about 25 years age, I should think. They placed a very long spear into the instrument they throw them with, and, after a few more gestures, descended from the reef and gradually came a little nearer, and I making signs of encouragement for him to come on, at the same time moving towards him. At last we arrived on the banks of the creek; he on one side and I on the other; he had one long spear, a wamara, and two instruments like the boomerang, but more in the shape of a scimitar with a very sharp edge, having a thick place at the end for the hand roughly carved. The gestures he was making were now signs of hostility. He came fully prepared for war; I then broke a branch of green leaves from a bush and held it up towards him, inviting him to come across to me. That he did not fancy, so I crossed the creek to where he was, and got within 2 yards of him. He thought I was quite near enough to him, and would not have me any nearer; he kept moving back as I approached. I wished to get close up to him, but he would not have it; we then stood still. I tried to make him understand by signs that all we wanted was water for two or three days. At last he seemed to understand, nodded his head, pointed to the water, then to our camp, and held up his five fingers. I then endeavoured to learn from him if there is water to the north or north-east. I could make nothing of him; he viewed me very steadily for a long time, began talking, and seeing that I did not understand him, he made the sign that natives generally do, of wanting something to eat, and pointing towards me; whether he meant to ask if I was hungry, or that I would make a very good supper for him, I do not know. I bowed my head as if I understood him perfectly. We then separated, keeping a careful eye upon him all the time I was crossing the creek; before I left him the other one joined. The first one was a tall, powerful, well-made man, upwards of 6 feet; his hair very long; he had a net of red colour tied round it close to the head. The ends of the hair were lying on his shoulder. I observed no other thing that was peculiar about them; they had no skins, nor anything round their bodies; they were quite naked. They then took their departure. A short time afterwards I saw them joined by five others; we have seen nothing more of them to-day. I hope they will not trouble us any more, and let me get my horses rested in peace.

Wind south, all the clouds gone; nights and mornings very cold; shoeing horses, repairing and making saddle-bags.

Thursday, June 14.—Bishop Creek. On examining the water-holes I find there are crab-fish in them, small, which leads me to think this water is permanent. This morning we again hear the voices of the natives up the creek, to the west of us; there must be plenty more water up there, the most of the birds go in that direction to drink. Passing this water the natives have not come near us to-day; their smokes have been round about us all day. Shoeing horses, repairing and making saddle-bags, which were torn all to pieces with the scrub.

Friday, June 15.—Bishop Creek. Resting horses and getting our equipment in order for another trial. I think the horses will be able on Monday morning. No more of the natives, their smokes are still around us. Wind, south. Day hot, nights cool.

Saturday, June 16.—Bishop Creek. Repairing for another trial; the horses are still drinking an immense quantity of water; they are at it five or six times a day; they must have suffered dreadfully. The grass is as dry here as if it had been the middle of summer instead of winter. I hope we may soon have rain, which will be a great blessing to me.

Sunday, June 17.—Bishop Creek. Horses still paying frequent visits to the water. We have found more water about a mile further up the creek, and seemingly to be plenty further up in the hills. I cannot examine it just now, in consequence of the natives being about. It would not do for me to leave the party, being so small, nor do I like sending one of them; they might be taken by surprise and cut off, which would ruin me altogether, being unable scarcely to do anything myself; although I am much better, I am still very weak; the pains in my limbs are not so constant now. I attribute the relief to my eating a number of the native cucumber, which are in quantities on this creek. The horse that was kicked by the mare is still very lame. Wind, south-east.

Monday, June 18.—Bishop Creek. Started at half-past 9 o'clock on a bearing of 15° , through a plain of alternate grass, scrub, and spinifex; and at 5 miles passed a number of isolated hills close together, composed of large masses of ironstone, quartz, and hard brown rock, very irregular and all sorts of shapes: the stones have the appearance of having undergone the action of fire. We then passed through some very bad spinifex, dark coloured, long, hard, and dry; we hardly could get the horses to face it. We then came upon a grassy plain, and at 10 miles struck a gum-creek coming from the west of north-west, and running at this place east-north-east; followed it and found an abundance of water in long deep holes, with shells of the crab-fish lying on the bank; the water is upwards of a mile; the creek then spreads out over a scrub, gum-trees, and grassy plains, and is joined by the other creeks coming from the McDouall Range. I thought it right and advisable to camp here for the rest of the day; a further journey would be a risk for the horse that is lame; I do not wish to lose any more if I can help it. In a few hours I shall cross Short Range, I am afraid he will not be able to do it. Natives about. Splendid grass on this plain and the banks of the creeks. Wind, variable. This creek I have named Phillips Creek, after John Phillips, Esq., J. P. of Kanyaka.

Tuesday, June 19.—Phillips Creek. Started at 8 o'clock on the same bearing, 15° ; first through a well-grassed plain with a little scrub; then again through hard spinifex to the range. 1 mile, crossed another gum-creek, with water in it coming from Short Range; at 4 miles reached the top of the spur of the range; at 7 miles top of range; 2 miles more to the east the range seems to terminate in a gum-plain, apparently a spur from the McDouall Range running the other side of the plain and crossing our line a few

miles further on. Short Range here is composed of quartz, ironstone, and red granite, with a little lime. Descended into the plain, and at 10 miles came upon another gum-creek, spread over a grassy plain; could find no water. At 13 miles came upon some some dry swamps, a number of birds about them. At 14 miles, top of next range from this, the appearance of the country on this course seemingly very scrubby, with no high hills in the distance. To the north the same; but on a bearing of 55° , in the far distance is apparently the termination of another range. I do not like facing the scrub again so soon after my late loss, from which my horses are not yet recovered. I shall return to the swamps and look for water, if I find any I shall start in the morning for the end of distant ranges; my lame horse is unable to do more to-day, crossing the range has been very hard upon him. Returned to the swamps and found a fine pond of water. Camped. The water is derived from the creek that we passed in the middle of the day; those I have named Kekwick Ponds, in token of the zeal and activity he has displayed during the expedition.

Wednesday, June 20.—Kekwick Ponds. Saddled at sunrise, and proceeded to the top of the low range, from which I turned back yesterday, and changed my course to 56° , to the northernmost highest point of distant hills; proceeded through an alternative plain of grass and spinifex. At 3 o'clock struck the William Creek again, with splendid grass on its banks, it ran nearly our course for about 3 miles, then turned to the east. We have now entered into the scrub again of the same description as that in which I lost my other horses, which continued until we reached the hills, which we did in 18 miles; from this we now see a range to the south-south-east; about 10 miles is a large lake, with apparently red sand-hills on the east side; I cannot see the extent of it, the hills I am on being so low; they are composed of granite, and running north and south. To the north and north-east is another lake, about the same distance, to which I will go on a course $32^{\circ} 30'$. The north side of this one seems also to be sand-hills with scrub. After leaving the hills 2 miles, we passed through a soft, sandy, scrubby country, and spinifex alternately. At 4 miles from the hills camped, without water; my horses have not recovered from their last trial; they seem to be very tired to-night from this, not a long journey; to-day has been very hot, and the scrub very thick and difficult to get through.

Thursday, June 21.—Scrub. The horses had gone back on the track, we did not get a start till half-past 8, course $32^{\circ} 30'$, to a high hill on the other side of the lake, passing through a thick scrub of cork-tree, gum, stunted, some large, and other low thick scrubs, with spinifex and grass. At 7 miles came upon what I thought to be the lake; turns out to be a large grassy plain, of rich alluvial soil, covered with dry grass, which gave it the appearance of a lake. Crossed in 3 miles to the top of the hill, no watercourse through, nor any water to be seen, a few low bushes in the middle. The hills on the north side are composed of ironstone and granite; from the distance looked very much like sand-hills; from the top of the hill I can see the plain extending a little to the west of north; I cannot see for the mirage. To the north-north-east is another plain of same description, much smaller, about 1½ mile broad, nearly circular, surrounded by hills of same description; no watercourse nor water. To the north-east is another very extensive one, its dimensions I cannot see; I seem to have got into the land of grassy plains and low stony hills. I wish my horses had had water, last night or yesterday they seemed to be very much in want of it. I must devote the rest of the day in searching for it. I shall now direct my course for the south part of the plains that I have just crossed, it seems to be the lowest part, and the flight of the birds is directed that way; searched all round, but could find no water. I must now return to Kekwick Ponds; the day is extremely hot; my horse cannot stand two more nights without water. If I do so I am sure to lose other two or three: would they had

more endurance! it is dreadful to have to turn back almost at the threshold of success. I cannot be far from the dip of the country to the Gulf. Returned by another course, where I camped last night; still no water. I would fain try the plain to the south; I dare not risk it; I can spare no more horses. Proceeded to the low range that I crossed yesterday; examined round it, but can find none. Camped. Two of the horses very much done up. I must back through that nasty scrub again.

Friday, June 22.—Under the west low range. Started at sunrise for the ponds; at half-past 1 arrived. Horses very much exhausted. I am glad I did not remain another night without water; three of them are completely done; it has been with difficulty that we got them here. Wind, south-west.

Saturday, June 23.—Kekwick Ponds. Resting horses, about 1 o'clock we were visited by two natives. They presented us with four opossums and a number of small birds and parrots. They were very much frightened at first: in a very short time they became bold on coming to our camp, and wanted to steal everything they could lay their fingers on. I caught one concealing the rasp, used in shoeing the horses, under the netting he had round his waist; was obliged to take it from him by force. The canteens they seemed determined to have; it was with difficulty we could get them from them. They wished to pry into everything, until I lost patience with them, and ordered them off. In about half an hour other two young men approached the camp. Thinking they might be in want of water, and afraid to come to it for the horses, I sent Ben with a tin dish full, which they drank. They were very young men, and very much frightened, and would not come any nearer. About one hour before sundown one of the first that came returned, bringing with him three other strange ones. Two of them were tall, powerful, well-made, good-looking men; as fine men as I have yet seen. They had a hat or helmet on the head, which looked very neat, fitted close to the brow, rising straight up to a round peak three or four inches above the head, and gradually becoming narrower towards the back part of the head: the outside is network, the inside is composed of feathers, very tightly bound with cord, until it is as hard as a piece of wood: it may be used as a protection from the sun, or armour for the battle-field. One of them had a great many scars upon him, and seemed to be a leading man. Only two had helmets on; the others only had pieces of netting bound round their foreheads. The other one was an old man, seemingly the father of those two fine young men. He was very talkative. I could make nothing of him. I have endeavoured to get information from him where the next water is, by signs, and so on; but I cannot understand him, nor, I suppose, he me. After talking to him some time, and his talking to his two sons, he turned round, and surprised me by giving one of the masonic signs. I looked at him steadily. He repeated it, and also his two sons. I then returned it, which seemed to please them much. The old man then patted me on the shoulder, and stroked down my beard. They then took their departure, making friendly signs until they were out of sight.

We enjoyed a good supper from the opossums, which we have not had for many a day before. I find the quantity of rations is not enough. The men are complaining of weakness from the want of sufficient nourishment. 5 lbs. of flour per week is too little for any length of time; it may do very well for a month or so, but when it comes to the length of time I have been out, we all feel it very much. The dried meat I brought with me being very young, it has not half the strength that old meat would have.

Sunday, June 24.—Kekwick Ponds. Our black friends have not made their appearance to-day.

Monday, June 25.—Kekwick Ponds. Started again from the top of low range, on a bearing of 345°, to some very distant hills, to see if I can get into the fall of the country to the Gulf of Carpentaria. At two miles crossed a

large gum-creek—with long beds of concrete ironstone—which I have named Hayward Creek, after Frederick Hayward, Esq. The banks are beautifully grassed, and extend for 4 miles on the north side; it then becomes scrub in some places, rather thick for a short distance, well grassed, with a little *spinifex* occasionally; and at 14 miles struck a large gum-creek, with large sheets of water in it, having a large number of ducks upon them; the Native Companion, Black Shags, cranes, and numerous other birds. Camped here for the remainder of the day. The course of the creek here is to the north of east, and coming from the north of west, apparently from the hills, which are distant about 10 miles: it very much resembles Chambers Creek. There are some small fish in the ponds, which are about 80 yards broad, and about three-quarters of a mile long, having large masses of concrete ironstone at both ends, separating one pond from the other; large gum-trees being in the pond. Wind north-west, very hot.

Tuesday, June 26.—Large Gum-creek, with sheets of water. I have resolved to follow this creek down to-day; if the water continues, to follow it out. Started on a course 77° , and at 6 miles crossed the creek, it running a little more to the north. Long sheet of water all the way down to this. The banks in some places are steep, the lower part formed of concrete, the upper of red sandy soil, which gives me a bad opinion of it for water if the concrete ceases. Here we saw some blacks. They would not come near us, but walked away as fast as they could. From the top of the rise we saw where they camped on the banks of a large sheet of water. We passed on without taking any more notice of them; and at 9 miles, not seeing any appearance of the creek, I changed my course to 25° ; at $\frac{1}{2}$ mile cut it again, but without water in it, it is much narrower and deeper, having sandy banks and bed; gum-trees growing in the bottom, which prevented me from seeing it. Changed again to 77° , it frequently crossing the course, and at 15 miles saw there was no hope of obtaining water; the country is becoming more sandy and covered with *spinifex* and thick scrub, crossing down to the banks of the creek, no rising ground visible; I must keep closer to the hills, and as the day has been very hot I shall return and camp at 9 miles from our last camp if there is water, if not I shall have to camp a short way above where we saw the natives this morning; I do not wish to get too near them, nor to annoy them in any way. We could find no water below where they were camped, I therefore pushed on to get above them before dark. About 8 miles from the creek we saw where they had been examining our tracks; as we approached the creek their tracks became very numerous on ours; when we arrived on the top of the rise from where we saw their camp and fires, we now could see nothing of them, neither smoke, fires, nor anything else; it was then nearly dark. I concluded they had left in consequence of having seen us pass in the morning, as natives do in general. I was moving on to the place where we crossed the creek in the morning, when suddenly up started three powerful, tall fellows, fully armed, having a number of boomerangs, waddies, and spears, from behind some scrub which we had just entered, their distance from us being about 200 yards. It being so near dark and the scrub we were then in being very disadvantageous for us, I wished to pass them without taking any notice; but such was not their intention. They continued to approach us, calling out, making all sorts of gestures, apparently of defiance. I then faced them, making every sign of friendship I could think of; they seemed to be in a great fury, moving their boomerangs above their heads, hawling at the top of their voices, and performing some sort of a dance; they were now joined by a number more, which in a few minutes increased to upwards of thirty: every bush seemed to produce a man. Putting the horses on to the creek, and placing ourselves between them and the natives, I told the men to get their guns ready. I could see they were determined upon mischief; they paid no regard to all the

signs of friendship I kept constantly making, but still gradually approaching nearer and nearer to us. I felt very unwilling to fire upon them, and still continued making signs of peace and friendship, but all to no purpose. An old man, the leader, who was in advance, made us understand by signs with his boomerang for us to be off, which proved to be one of defiance. I had no sooner turned my horse's head to see if that was what they wished, than we received a shower of boomerangs, accompanied by a fearful yell; they then commenced jumping, dancing, yelling, and throwing their arms into all sorts of postures like so many fiends, setting fire to the grass. I could see now many others getting up from behind the bushes, besides the thirty that were in front of us; still I felt unwilling to fire upon them, trying to make them understand that we wished to do them no harm. They were now approaching very close to us, about 40 yards off; again they made a charge, and threw their boomerangs, which came whistling and whizzing past our ears, one of which struck my horse. I then gave orders to fire, which stayed their mad career for a little; our pack-horses, which were on before us, took fright when they heard the firing and fearful yelling, and made off to the creek; and, seeing the other blacks running from bush to bush, with the intention of cutting us off from them, while those in front, still yelling, throwing their boomerangs, were coming nearer to us, I gave them another reception, and sent Ben after the horses to drive them on to a more favourable place, while Kekwick and I remained behind to cover our rear. We soon got in advance of those who were endeavouring to cut us off. They still kept following, but beyond the reach of our guns, the fearful yelling still continuing from more numerous voices, and fires springing up in every direction. It being now quite dark, the country scrubby, and our enemies numerous, bold and daring, we could be easily surrounded and destroyed by such determined fellows as they have shown themselves to be. Seeing there is no hope with such fearful odds against us—ten to one we could see, but how many more there were of them who endeavoured to cut us off I cannot tell,—knowing all those disadvantages under which we laboured, I very unwillingly made up my mind to push on to our last night's camp, which we did. Now I have had a little time to consider the matter over, I do not think it prudent to remain here to-night; I shall therefore continue on until we reach the open grassy plains on Gum Creek. They are still following us up. I only wish that I had four other men; my party being so small we can only fall back and act on the defensive. If I were to stand and fight, which I wish I could, our horses must remain unprotected, and we in all probability would be cut off from them, which they seemed to be aiming at, and to prevent our advance up the creek. By this time they have learnt different; we did not go a step out of our course for them. Arrived at Hayward Creek 11 o'clock.

Wednesday, June 27.—Hayward Creek. Last night it was my intention to have gone this morning to Kekwick Ponds to water the horses, give them the day to rest, and to have proceeded the next day back again to the large creek, and go on to the distant hills that I was steering for on the 25th instant. After considering the matter over the whole night, I have most reluctantly come to the determination of abandoning the attempt to make the Gulf of Carpentaria, as being most imprudent, situated as I now am; my party being far too small to cope with such wily, determined natives as those we have just encountered. Their arrangements and manner of attack were well conducted and planned as Europeans could do it. They observed us passing in the morning, examined our tracks to see which way we had gone; knew we could get no water down the creek, and must return to get it above them, and thus they must have planned their attack. Their charge was in double column, open order, and we had to take steady aim to make an impression. This morning we saw signal smokes all round us. With such as those for enemies in our rear, and most probably far worse in advance, it would be destruction to all my party for me

to attempt to go on; all the information of the interior that I have already obtained would be lost, having only half-rations for six months, four of which are gone. I have been reducing as much as I possibly could, in case of being out a longer period. My men are now complaining of great weakness, and are unable to perform what they have to do. Only two showers of rain having fallen since March, I am afraid of the waters drying up to the south. I fully expected rain by this time: not a drop; nor is there any likelihood or appearance of it. The days are now become very hot again, the feed for the horses as dry as if it had been in the middle of summer; they are very much reduced in condition, so much so that I am afraid of them being longer than one night without water. My health being so bad, I am hardly able to sit in saddle the whole day. After taking all these things into consideration, it would be madness and folly to attempt and risk more. If my own life would be the only sacrifice, that I would willingly risk to accomplish the end that I aimed at; it seems that I am destined not to obtain it. Man proposes, but the Almighty disposes; and His will must be obeyed. Seeing the signal-smokes around, and judging that our black friends at Kekwick Ponds might have been playing a double part with us, I gave them a wide berth, and steered for Bishop Creek, where we arrived in the afternoon. No natives have been here since we left. They seem to be very numerous, judging from the number of graves (which are in trees) that we have passed between this and the large creek where they made their attack upon us. These natives have quite a different cast of features from those in the south; they have neither the broad flat nose and large mouth, nor the projecting eyebrows. Have more of the Malay; they are tall, muscular, well-made men. I think they must have seen or encountered white men before.

Thursday, June 28.—Bishop Creek. Camped at the Rocky Water-hole, north-east side of the McDouall Range.

Friday, June 29.—Anderson Creek. Crossed the McDouall Range, and camped on gum-creek north-east side of the Murchison Range, which I have now named Gilbert Creek, after Thomas Gilbert, Esq., late Colonial Storekeeper.

Saturday, June 30.—Gilbert Creek. Crossed the Murchison Range and the large gum-creek coming from thence and running west-north-west, which I have named Baker Creek, after the Hon. John Baker, M.L.C. I did not examine it, but, judging from its appearance and the native smoke, I should think there is water in it. Proceeded to the creek where we camped before; found all the water gone, only a little moisture in the bottom of the holes. This I was rather surprised at; I thought it would last three months at the least. Went to another creek, where there was a large hole of water in conglomerate rock; this we found also to be very much reduced. When we last saw it its depth was 4 feet; now it is reduced to 18 inches. Camped.

Sunday, July 1.—Murchison Range. My horses are very tired, and three of them are nearly done up.

Monday, July 2.—Murchison Range. Proceeded to the Bonney Creek, to get feed for the horses, there being but very little besides spinifex under the ranges. Native smokes on or about the creek; must be very careful.

Tuesday, July 3.—The Bonney Creek. We have seen none of the natives yet. I shall rest the horses to-day, there being plenty of feed, which they want very much. Being so very few of us, I am obliged to turn them out with the saddles on; so that, if we are attacked again, one can put the packs on while I and the other defend him. The water in this hole is very much reduced; I think it will not fail altogether, in consequence of the small fish being in it. Seeing the appearance of the water since I left here, I am inclined to think I shall have a very hard push to get back, my horses being so weak

from the hardships they have undergone. They are now unable to do as much as they did before. I am afraid that I shall get no water between this and Forster Range, a distance of upwards of 80 miles. I will rest them here for a week, if the natives will be quiet; if not, I must run the risk of losing more of them. To-day I had made up my mind to follow out this creek, to see if the waters continue, and if it would take me to the north of the spinifex and gum-tree plain that I had to turn back from on my north-west course from Mount Denison; and, if rain falls, try again for the Victoria river. Again I am disappointed, for, on weighing the rations, I find I am terribly short, which I did not expect, and which cuts off all hope of my attaining that point. My troubles and vexations seem to come upon me all at once. If I had a stronger party and six months' rations, I think I would be able to do something before I returned. I have tried to do my best, and can do no more. My eyesight is now so bad that I cannot depend upon my observations, which will be a great loss to me. The scurvy has returned with greater severity. Before I start on my return, if everything goes right, I shall run down this creek a short distance. It may at some future time turn out to be the road to the Victoria river, or one of its tributaries. Wind, south and south-west.

Wednesday, July 4.—The Bonney Creek. The water in this water-hole is reducing very rapidly since we have been here; it is falling at the rate of 6 inches per day, which is a poor look-out for us on our homeward course. I have not a day to spare now; the weather is becoming very hot, and will dry it up much faster. I must push back as soon as my horses are rested, and able to undergo the 80 miles without water. I must give up the examination of this creek, for every day now is of the utmost value to me. I must not give the horses one mile more than I can help. Oh that rain would fall before I leave this! It would be an inestimable blessing; for I am doubtful whether I shall be able to get all my horses through the 80 miles; three I am afraid of. Wind from all points at sundown; a few clouds have made their appearance.

Thursday, July 5.—The Bonney Creek. During the night it became very cloudy from the west, and this morning still continues; my hopes are again raised. If it should rain, I shall try for the Victoria river again, even though I should be without rations for my return. I can kill off one of my horses, and dry his flesh, and that will take me back. Still very cloudy; has every appearance of rain. Making preparations for another trial. Sundown, still heavy black clouds coming from the west, which have raised our hopes of success to the highest point, which I ardently trust will be realised. No natives have come near us yet; they are still about.

Friday, July 6.—The Bonney Creek. A sad, sad disappointment; all our most sanguine hopes are again gone. During the night the clouds broke up, and have all vanished; it is very vexing. I shall rest the horses until Monday, and then commence my homeward journey, but with low spirits. I dare not venture into a new route, for want of water; and the low condition of my horses compels me to keep my former track. Last night I observed the comet for the first time about 10 o'clock, above the west horizon; it set at 7 o'clock, 20° north of west. At sundown it has become overcast, with heavy clouds. My hopes are again raised; I trust we may get it now. Midnight, still cloudy; every appearance of rain. Wind changeable.

Saturday, July 7.—The Bonney Creek. Alas! all the clouds are again gone; our hopes were only raised to be dashed down with greater disappointment. The wind has returned to its old quarter, south-east. Natives still about, but they do not come near us. I shall now prepare for my return on Monday morning. It is very disheartening.

Sunday, July 8.—The Bonney Creek. The weather has every appearance of being dry for some time to come, not a cloud to be seen; the wind south-

east, very cold night and mornings; all the hope of making the coast is now gone. On weighing our rations to-day I find a great loss, no doubt through some accident or otherwise.

Monday, July 9.—The Bonney Creek. Started for the Devonport Range, water all dried up where we camped before; ascended the range; changed my bearing to Mount Morphet 196°, in the Crawford range, in the hope of finding water there. At 4 miles struck the creek that I had before crossed nearer to the range, found water, and camped to give my horses every chance. This creek I have named Barker Creek, after Alfred Barker, Esq., brother-in-law to James Chambers, Esq. I do not think the water is permanent, the number of birds that are passing this water and flying up the creek. I think there must be permanent water; this range seems to yield a deal of water on both sides; native graves also. Wind, same quarter.

Tuesday, July 10.—Barker Creek. Started at half-past 6 o'clock, on a bearing of 196° towards Mount Strzelecki. At 6 miles crossed a gum-creek coming from the range and running to the west on my former track. I crossed it where it lost itself on the plains. The country is well grassed, with a little spinifex occasionally from the range to this; at 12 miles it became scrubby and sandy with a little grass, spinifex predominating, which continued to where we camped. Wind, south-east.

Wednesday, July 11.—Scrub north-north-east of Mount Strzelecki. One of the horses having parted from the others, had gone a long way off in search of water, which caused it to be 9 o'clock before we could get a start. At 7 miles arrived at lagoon, north-east of Mount Strzelecki, found a little feed and water for the horses; camped to give them the benefit of it. Wind, south-south-east; cold.

Thursday, July 12.—Lagoon, Mount Strzelecki. Made an early start; crossed the range on a south course, very difficult and rough. Could see no water on our course. To the south-east of Mount Morphet there is also the appearance of a creek; on to the south-west there is also the appearance of a watered country; it is more hilly. Proceeded on through the thick dead mulga-scrub to the north side of Forster Range, where we camped at dark; distance 32 miles, no water. The country passed over to-day is splendidly grassed, especially as we approached the range; there is also a little spinifex, but not much.

Friday, July 13.—North side of Forster Range. Started early, proceeded to the gum-creek coming from the north side of Forster Range; found a little water, numerous fresh tracks of natives, a great number of birds. This creek I have named the Barrow, after John Barrow, Esq., M.P. Crossed the range to the Stirling Creek, followed it down, and found an abundant supply of water; the upper part of it is now dry. It is difficult to say whether it is permanent or not; but, to judge from the number of native-tracks, encampments, and the many birds, I should think it is. The wood-duck is also on some of the pools at dark. We can hear the natives down the creek.

Saturday, July 14.—Stirling Creek. I shall give the horses to-day and to-morrow rest; I do not expect to get water before we reach the reservoir in the Reynolds Range, I am afraid it is all gone in the Hanson and at the Centre.

Sunday, July 15.—Stirling Creek. Resting horses, &c.

Monday, July 16.—Stirling Creek. The natives were prowling about during the night, startled three horses, which separated from the others and went off at full gallop; they were recovered about noon, 4 miles distant. Too late to start to-day, for which I am very sorry, for every hour is now of the utmost value to us, in consequence of the evaporation of the waters. Not the slightest appearance of any rain yet. Wind, south.

Tuesday, July 17.—Stirling Creek. Proceeded to the Hanson. Shortly

after we started we were followed by the natives shouting as they came along, but keeping a respectable distance. They followed us through the scrub for about two hours, when we came to the open ground; at the lagoons they went off. I intended there to have spoken to them, judging that it would not be safe to do so in the scrub. They were tall powerful-looking fellows. They had their arms with them. We then proceeded to the Hanson, crossing numerous fresh native-tracks. On nearing water we saw five, who took fright and went off at full speed. Saw a number more in the distance; there seemed to be a large number of them here. The country all round is covered with their tracks. Found water still there, but had to clear the sand away a little to give the horses a drink. Thinking it would not be safe to camp in the neighbourhood where there were so many, I went on to the Central Creek. In going through some scrub we again disturbed some more natives; we could only see children. One little fellow, about seven years old, who was cleaning some grass-seeds in a wurley, with a child who could just walk, the moment he saw us he jumped up and seized his father's spear, took the child by the hand, and walked off out of our way. It was quite pleasing to see the bold spirit of the little fellow. On nearing Central Mount Stuart we saw other two men, who made off into the scrub. After dark arrived at the creek; the water is all gone. On examining the hole where the water was, we discovered a small native well, with very little water, too little to be of any service to me. To-morrow morning I must push on through the scrub to Anna Reservoir. My horses are very weak still. I do not think they will be able to do it in a day. Wind, variable.

Wednesday, July 18.—Centre. Made an early start, crossed the Hanson, got through the scrub to the gum-plains at sundown, where we camped; the horses not able to do the journey in one day; no water; the gum-creeks empty themselves into it. There must be water not far away, from the number of birds that are about. I have no time to search for it; if I do not find water in the gum-creek, which is doubtful, the horses will have another long day's journey; they seem to feel the want of water much. From the dryness of their feed three of them are infected with worms. Wind, south-east.

Thursday, July 19.—Gum Plains. Proceeded through the remainder of scrub, and arrived in the afternoon at the gum-creek, where we found a little water. Cleared away the sand; obtained enough for our horses. There will be enough for them to-day and to-morrow morning; I shall therefore remain here for the remainder of the day. They must have rest at Anna Reservoir until Monday, before I attempt the large scrubs between this and the MacDonnell Range. There are some heavy clouds coming up from the west and south-west, which I hope will give us some rain; wind still from the south-east. I observe the natives have been following our track through the whole of the scrub in great numbers; many of their tracks in and about this creek quite fresh. The waters drying up fast round and about this creek has caused them to come into the permanent ones.

Friday, July 20.—Gum-creek, north-east of Mount Freeling. Crossed the Reynolds Range to Anna Reservoir; we still found that full of water. I may now say this is permanent; the water we camped at is gone, but there is still a little down the creek. We could not get enough for the horses this morning in the creek we have left. Judging from the number of native-tracks that we have crossed this morning, there must be permanent water on the north side of the range, which is composed of immense blocks of granite, apparently on the top of mica-slate, with occasional courses of quartz and iron-stone. To the north-east, where we camped last night, about 3 miles distant is the point of the range, on which there is a very remarkable peak (high), composed of ironstone, with a number of very rough ironstone hills rounded; this

I have named Mount Freeling. I found indications of copper, the only place I have seen it in all this journey. The natives do not seem to frequent this reservoir much of late; there are no fresh tracks. Between 2 miles of it, in the creek close to it, there are numbers of very old wurrilas. No rain; clouds all gone. Wind still south-east.

Saturday, July 21.—Anna Reservoir, Reynolds Range. I shall remain here until Monday morning to rest the horses, which they much require. They have all sore backs. The sore made its appearance in a small pimple under the saddle, which has gradually spread into a large eruption which we cannot heal up. It makes them very weak. The clouds have again made their appearance from the north-west. The wind has also changed to that quarter. I hope now we shall get some rain to enable me to make short journeys each day for my horses, to enable them to gather some more strength. Two long journeys in one day does not do with them now, after the six days' rest I gave them at the Honney Creek. Two days' long journey, without water, would reduce them again to the same state of weakness as before. The last 14 days we have been getting a quantity of the native cucumbers and other vegetables, which has done me good. The pains in my limbs and back are much relieved, and will, I trust, soon go away altogether; of which indeed I have no doubt, if the vegetables and cucumber continue. We boil and eat them with a little sugar. In this way they are very good; the taste resembling the gooseberry. We have obtained from one vine upwards of 2 gallons of them, from 1 to 2 inches long, and 1 in breadth.

Sunday, July 22.—Anna Reservoir. On examining the creek, we have found some more large and deep water-holes; this creek I have named the Wickstead Creek. The clouds are again heavy, and have every appearance of rain. Wind and clouds are from the north-west.

Monday, July 23.—Anna Reservoir. No rain has fallen; all the clouds again are gone. Made an early start for the north gorge in the McDonnell Range. At dark camped in the thick scrub and spinifex. No feed for the horses; had to be tied up during the night. Wind south-east again.

Tuesday, July 24.—Dense scrub and spinifex. Started 20 minutes to 7, through the remainder of the scrub to the gorge; arrived at 5 minutes past 7 o'clock. Camped outside. Drove the horses up to the spring; there is still the same supply of water. It is an excellent spring, and might be of great importance to future exploration. I have named it Hamilton Spring. Wind variable.

Wednesday, July 25.—Hamilton Springs, McDonnell Range. Resting the horses yesterday afternoon we passed a great number of fresh native-tracks, apparently going to Hamilton Peak, which leads me to think there must be permanent water there. The peak is very high, quite as high as Mount Arden; there is another part of the spur higher than it, to which I have given the name of Mount Hugh. Further to the west-north-west is a mount still higher, which I have named Mount Hay. Wind north-east. It has been very hot to-day.

Thursday, July 26.—Hamilton Springs, McDonnell Range. This morning the wind has changed to the north-west, heavy clouds coming from that quarter. Proceeded across the ranges by Brinkley Bluff; camped on the east side. Still plenty of water in the Hugh, although greatly reduced. The natives have been following our tracks (the former ones) in great numbers; some of their foot-prints are very large. There is a large quantity of marble in this creek.

Friday, July 27.—Brinkley Bluff, McDonnell Range. Started down the Hugh; camped south-side of Brinkley Bluff; found plenty of water all the

way; some small, some large holes of water with reeds and rushes growing round them, with plenty of feed on the banks. Wind variable.

Saturday, July 28.—Hugh, south side of Brinkley Bluff, McDonnell Range. Proceeded towards the Crawford Range;* stopped at my former camp of the 11th April. The spring is still good; an abundance of water. We have also found another good spring on the south side of the creek; the creek here is very broad, nearly 200 yards wide. Good feeding-country all round, with a small strip of salt-bush on the bank; splendid gum-trees in the creek. Wind east; sun hot.

Sunday, July 29.—Hugh, between Crawford and McDonnell Ranges. Wind variable; some clouds coming from the south-west.

Monday, July 30.—Hugh, between Crawford and McDonnell Ranges. Proceeded towards the range. At 4 miles crossed the creek, and another half-mile entered the ranges; made our camp of the 9th on the creek, but no water. Followed the creek down to the westward, and found some in the sand; cleared a hole; found enough for our own use. Camped. Very unwell. Wind south-east. Not a drop of rain has fallen since we were here before.

Tuesday, July 31.—Between the James and Crawford Ranges. Started on a course 220° following down the creek, through James range instead of crossing it. I am afraid there will be no water at our camp on the south side. I have a chance of getting some in the range. At 2 miles met with a good water-hole under the sandstone hills. At 7 miles the creek enters the range: the bed is broad, sandy, and gravelled. Found some water at 12 miles, and camped, as I am too unwell and unable to continue in the saddle any longer. Cleared a hole; obtained water sufficient for our purpose. Wind south-east.

Wednesday, Aug. 1.—In James Range, on the Hugh. Followed the creek through the remainder of the range; found water in four different places. I have not the least doubt but there is plenty; the creek is so broad and divided into so many courses that it would require four men at least to examine it well. I might have passed plenty. On arriving at our camp of the 7th April, all the water gone: scratched in the sand, found a little moisture, but no water. Searched for an hour, but could find none. Was going back to the last water that I had seen, which was 6 miles distant, when I observed two emus coming into the creek. Saw them making for a large gum-tree in the middle of the creek; went to it and found a fine hole of water round its roots. I was very glad to find it, as it was my intention to follow this creek down to see where it empties itself—that is, if I can find water all the way. I cannot trust my horses more than one night without; some of them could do a much longer time, but the others cannot. I am sure to lose some of them, which I do not feel inclined to risk. Camped. Wind the same.

Thursday, Aug. 2.—Hugh, south side of James Range. Proceeded down the south side of the creek through good grassy country: a few stony hills; also salt-bush. Again, at 14 miles, we found a native well, about 4 feet deep, in a side creek. Camped here. As there is little prospect of finding any more in the Hugh, it has become so broad and sandy, there is little chance of getting surface-water, my men being so weak, and not having the means of digging. I must now steer for the Finke, which I hope will answer our purpose better. The horses are suffering very much from bad backs. There is plenty of water under this sand; but, having only a small tin dish, the labour is too great for the weak state of the men; they have now lost all their former energy and activity, and move about as if they were 100 years old: it is vexing to see them. On the south side of the creek are a number of isolated hills, very

* For "Crawford Range," the Adelaide journals read "Waterhouse Range."
—Ed.

rough, chiefly composed of limestone of a brown colour, mixed with iron-stone, quartz, and granite. This morning there was ice on the water left in the tin dish, and also in the canteens, an eighth of an inch thick : it was very cold.

Friday, Aug. 3.—James Range. I find the water in the well is nearly all gone this morning : to remain and water the horses here would take us 9 hours, so slowly does it come in. I must go back to our last camp. I shall follow the creek round ; there might be a chance of getting a little sooner than the last camp. Saddled, and proceeded up the creek. At 4 miles found a little under the limestone rocks coming from a small side creek ; gave the horses a drink, and made for the Finke on a course of 165°. The bank of the Hugh, on the south side, is lined with about 1 mile of red sand-hills covered with spinifex ; it then becomes red, light, sandy soil, with plenty of grass and spinifex. Crossing a few stony hills and small plains, at 10 miles we ascended a broken table-range, which I have named Warwick Range after — Warwick, Esq., sheep-farmer at the North : it is composed of hard, grey limestone and iron-stone. We then proceeded through a well-grassed country with mulga-bushes, and at 20 miles camped under a red-stone hill, not being able to reach further ; no water. Heavy clouds, and wind coming from the south-east. The wind and clouds came again this morning.

Saturday, Aug. 4.—Small hill between the Finke and Hugh. No rain, clouds all gone. Horses strayed a long way off this morning ; did not get them until after 11 o'clock ; did not get a start till after 12 o'clock. Passed over a country of much the same description as yesterday, crossing three stony hills running nearly east and west ; and at 9 miles camped, without water, in a fine grassy country ; the grass green, which will be quite a treat for the horses, about 6 miles north of Chambers Pillar. Wind south-east.

Sunday, August 5.—North of Chambers Pillar. At sunrise, heavy clouds came up from the south-east, bringing with them a very thick fog, through which I had great difficulty in steering my course ; it cleared off about 10 o'clock. I expected rain, but none has fallen ; it is now quite clear again. At 12 o'clock arrived at the Finke, and was very much surprised to find so little water. I had no idea it would have gone away so soon. The bed is very broad and very sandy, which is the cause of the large quantity disappearing so soon ; that I saw when I crossed before. I have little hopes of finding any further down ; which will be a great disappointment, as it was my intention to run it down, in the hope that it would take me into South Australia. I shall go one day's journey down and see what it is. If I can find no more water I shall require to return to this to rest my horses, and push for the Stevenson. I do not expect to get any water before I reach that creek ; if there is none there I am afraid I shall lose all my horses. To remain here I cannot. This water will only last a short time ; I have only provisions to carry me down. Not the least appearance of rain. I am afraid my retreat is cut off, judging from the state the water is in in the creek and the appearance of the weather—not the least sign of rain. From the weak state the men are in I do not think it will be prudent in me to follow this creek. Wind south-east ; clouds.

Monday, August 6.—The Finke. Thick fog again this morning. After considering the matter over during the night, from the heavy clouds that have passed yesterday to the south of us, I think there is a chance of a shower of rain having fallen there ; I ought not to allow the chance of it to escape ; to all appearance it is the only one that I will get until the equinox ; I have not provisions sufficient to remain until that time. I must push the horses as far as they will go ; we must walk the rest, which has a very black appearance, from the weak state we are in. Proceeded to the south-east on my former course, having camped on two clay-pans. I think there is a chance of water if a shower has fallen there. Started on our former course, and arrived at the

clay-pans without seeing a drop of water; neither is there any in the clay-pans. Camped; the horses being so tired, coming through so many sand-hills. No rain.

Tuesday, August 7.—Clay-pans in Sandhills. A light dew felt last night and this morning, which I am very glad of; it will be a good thing for the horses. Kekwick unwell last night. I cannot stop on that account; he must endure it the best way he can. If I find water where I suppose the Finke joins the gum-creek that runs a little north of Mount Humphries, I will remain there a day to give him rest. He is completely done up; I hope he will not get worse. I must push back as quick as possible, and get him into the settled districts. At noon made the creek, which is the Finke; still the same white sandy bed, but here very broad. The east bank is composed of white sandstone, a course of light slate on the top of it, then courses of limestone and other different sorts of rocks and stones on the top of it, and on the top of all red sand-hills; its width about $\frac{1}{4}$ mile. The gum-trees not so large as they are further north. On first striking it we could find no water; but by following it down for a short distance we found a little, which will do us. It is more than I expected, and feel most thankful for it. Kekwick still very ill; he is suffering very much, poor fellow! I dare not show him much pity, or I would have the other one lay by altogether. I hope and trust he may soon get better again; to-morrow's rest may do him good. He has been a most valuable man to me, in whom I place entire confidence; a better one I could not have got. I wish the other had been like him, neither he nor I would have suffered so much from hunger. Wind south-east.

Wednesday, August 8.—The Finke. Resting Kekwick and shoeing horses. This water is going away very rapidly. Rode down the creek for 10 miles to see if there is water, that I may risk following it down. After joining the west creek it spreads itself over a broad valley, bounded on the north by sand-hills, on the south by stony hills; course eastward. It is divided into deep numerous courses, very sandy; immense quantities of drift-wood, some very large gum-trees, piled high on the banks; a great number of birds of every description, but I could find no water. It is so broad, with so many courses, that it would require six men to examine it well. I might have passed many waters; judging from the number of birds I should think there is, although I could not find it. From the state which Kekwick is in, and the dry state of the weather, I do not consider it right to risk his life. If we find no water, and that on a-head dried up, we should lose the horses and have to walk, which he could not do. I must make the Stevenson, where I am almost certain of water. Wind east.

Thursday, August 9.—The Finke. Started early on our former tracks, passing Mount Humphries and Mount Beddome. Camped at our old place. I should think, from the appearance of the country, the Finke takes a south-east course from where I left it yesterday; the hills are running in that way. Wind south south-east.

Friday, August 10.—South of Mount Beddome. Proceeded on our former course to the Stevenson, which we made a little before dark, and found water, but am surprised to find so little left. The fine large holes are nearly dry. Wind, east.

Saturday, August 11.—The Stevenson. The horses having lost some shoes, I am forced to remain here to-day to put some on. There is more water a little further down the creek, at which I camped. No rain seems to have fallen since I was here before. The sun has been very hot to-day. Wind east south-east.

Sunday, August 12.—The Stevenson. Being too unwell to move yesterday, and feeling a little better this morning, I have ridden down the creek. For 3 miles it takes a south-east course; then east 3 miles; then east south-east

through table-land; the hills rocky and precipitous through which it goes. I went on a south-east course for 9 miles, through a splendid grassed country; it is rather stony, with numerous small creeks running into the Stevenson. The last 3 miles was on table-land covered with grass. I then turned to the north-east, and at $1\frac{1}{2}$ mile cut the creek; going through the table-land, with abundance of water, and likewise of most splendid grass up to the saddle-flaps, and quite green. Where I left off it is about 200 yards wide, in two or three courses. I suppose it will get narrower as it gets further into the table-land. I then turned and followed the creek up to the camp. I found plenty of water; in many places it divides itself into many courses, in all of which I found water. In some places there is a little mulga-scrub, but not thick; also small open plains, covered with grass and little salt-bush. It very much resembles Chambers Creek. Ducks of different descriptions on the water-holes, and numerous other birds; it is quite alive with them. It is my opinion that it comes more to the south-east, after getting through the table-land; I shall therefore direct my course that way to-morrow, and cut it, if it does. I regret that I have not provisions sufficient to enable me to follow it round its different bends. It is a splendid feeding-country for cattle. Wind south-east, with a few clouds in that quarter.

Monday, August 13.—The Stevenson. Started on a course of 135° to see if the Stevenson comes to the south. Continued on the table-land, from where I left it yesterday, for 16 miles from last night's camp, when we suddenly dropped down into the bed of a large, broad, sandy gum-creek, coming from the west, which I find to be the Ross Creek. In the bed are growing a great many rushes. It runs in three or four courses; water can be had in them all by scratching a few inches in the sand. There is still water on the surface, but not in very large holes. The land is quite damp and moist all over it, which is 300 yards broad. A great number of birds. It is raining east from this. Camped. My course takes me across the middle of a range, which I saw in coming up, and will endeavour to cross it to-morrow, and will continue on this course if I find water. Wind south. The banks are springy; I have seen two small springs, but they are brackish.

Tuesday, August 14.—The Ross. Started on the same course 135° , and again ascended the stony table-land, crossing three small myall-creeks, about 1 mile apart. Numerous birds about; their course north-east. At 7 miles we crossed another, and found a fine, large, deep hole of water, with ducks and a diver on it. We again ascended the table-land, which continued to the range, and at 16 miles gained the top; the view is extensive to the east, north-east, and north. To the east is still a continuation of table-land and undulating country, through which are running numerous myall-creeks. To the eastward, no rising ground in the distance; to the north-east, the same description of country, with rising country in the far distance; to the north, the same, with broken ranges and isolated hills in the distance about 30 miles off. It is all apparently well grassed; no timber except in the creeks, which is myall and mulga; the top of the range is table-land, also about a mile broad. We then descended on a course of 175° . To the south-east is a continuation of the range, and in the distance is seemingly the mulga-scrub, which caused me to change my course, and to search for water in the creek below. After leaving the range, we crossed a number of myall-creeks coming from the range, and running to the south-east. In many of them the water had just dried up; and at 6 miles on this course we found water in one, and camped. The horses being tired, having a very rough and stony journey. This water is not permanent, although when full it is very large and deep, and will last a considerable time. The country passed over to-day, although very stony, has an abundance of grass on it, with a little salt-bush occasionally. Plenty of birds about; also duck on the water. Wind east.

The Stevenson and the Ross seem to take a course north of east. There

is a dark shade under the distant range north, which I suppose to be them. On a further examination of this creek, I have found a large water-hole; it is deep, about 200 yards long and 80 broad; a number of duck upon it, and many plants that grow round permanent water; splendid feed all round. I also found shells. I have named it Anderson Creek, after James Anderson, Esq., Port Lincoln; and the range Bagot Range, after the Hon. the Commissioner of Crown Lands.

Wednesday, August 15.—Anderson Creek. Started towards the south-east point of range, which I found to be 5 miles distant. The country between us is undulating and stony, but plenty of grass. To the south and south-east is the mulga-scrub, and grassy plains between; to the east in the distance, about 30 miles off, isolated hills bearing 100°. At 6½ miles crossed a myall and gum creek with water. About 1½ mile to the eastward, in this creek, under a red bank, is a large water-hole, seemingly permanent. At 10 miles, crossed the bed; very sandy in many courses, the banks of which are covered with rushes, and, in many places, the beds also; a good deal of water still on the surface, but no large body where I crossed. The rest of the day's journey is through the mulga-scrub and sand-hills, in which we camped. No water. The feed is abundant in the scrub, and it is not so thick as when I crossed it before. Wind south.

Thursday, August 16.—Mulga-scrub and sand hills. Started at 7 o'clock, course 170°; and at 11 o'clock made the Neale, found plenty of water, and camped about 3 miles north-west from my former camp; the bed of the creek is that breadth, with many large water-holes. Wind east.

Friday, August 17.—The Neale. Proceeded on a south-east course, and camped on a side branch of the Neale. Plenty of water in large holes. Wind east.

Saturday, August 18.—Side branch of the Neale. Proceeded towards the gap in the Hanson Range, and camped at one of the large water-holes. Very cloudy. Wind east.

Sunday, August 19.—Gap in Hanson Range. Still very cloudy; looks very much like rain. I must push on to-day, in case the Peak should come down and stop me, which the state of my provisions will not allow. Having lost a considerable quantity of flour by the scrub tearing the bags, we have now not enough to take us to Chambers Creek. Started and camped 8 miles west-north-west of Freeling Springs, having given the horses a drink in again crossing the Neale. Still very cloudy. Wind east.

Monday, August 20.—Sand-hills west-north-west of Freeling Springs. Still cloudy and threatening rain. Proceeded to the Kekwick Springs, to see if the horse had got out of the Peake that we left there. In going up, we found his bones; he does not seem to have made a struggle to extricate himself after we left him. His bones were in the same position. A great many natives seem to have visited him, judging from a number of their tracks all around him. Proceeded to the Freeling Springs, and camped there. A number of duck and two swans on the large water-hole. Shot one of the latter, which was a great treat to us, for we had great pleasure in again allaying the pangs of hunger. Wind variable; still cloudy.

Tuesday, August 21.—Freeling Springs. Still very cloudy; a few drops of rain fell. Wind north-east, distant thunder and lightning. Resting horses.

Wednesday, August 22.—Freeling Springs. Proceeded through Denison Range, and camped at the Milne Springs. Still cloudy, but no rain. Wind north-east.

Thursday, August 23.—Milne Springs. Proceeded and camped at Loudon Spa. Wind variable.

Friday, August 24.—Louden Spa. Camped at William Spring. Wind north-west.

Saturday, August 25.—William Spring. Proceeded to the Strang-

ways and Beresford springs, and camped at Paisley Ponds. Wind north-east. Cloudy.

Sunday, August 26.—Paisley Ponds. Wind north-east; thunder and lightning from the north and west, with a few drops of rain during the night. This morning, still cloudy, every appearance of rain; had a few showers during our journey to Hamilton Springs. Found Mr. Brodie camped about 3 miles south-east from Mount Hamilton, by whom we were received, and treated with great kindness. Camped. Wind north; cloudy.

Monday, August 27.—Hamilton Springs. Wind north-east. Heavy shower of rain during the night. As some of the horses want shoeing, I shall remain here to-day and have them put on. The horses have strayed away during the night, and only two can be found to-day.

Tuesday, August 28.—Hamilton Springs. Searching for the horses; which cannot be found, the rain having obliterated the tracks. Wind south-east; clouds all gone.

Wednesday, August 29.—Hamilton Springs. Searching for the missing horses, which cannot be found. Wind south-east.

Thursday, August, 30.—Hamilton Springs. Still no horses. I think they must have gone to Chambers Creek. I have 5 white, and 2 black men searching for them. They cannot track them away from the creek, in consequence of the rain having washed them out. I shall try again to-morrow. Wind south-east.

Friday, August 31.—Hamilton Springs. The same result; they cannot be seen; they must have gone down to Chambers Creek. I shall borrow a horse, and go down there to-morrow. Wind south-east.

Saturday, September 1.—Hamilton Springs. Proceeded to Chambers Creek, and learnt they had seen nothing of them; found Mr. Goyder and party. Camped on the creek.

Sunday, September 2.—Chambers Creek. Cloudy, with a few showers of rain. Wind south, south-east.

Monday, September 3.—Chambers Creek. Searched the creek, but no horses.

VIII.—Voyage up the Darling and Barwan. By Mr. W. R. RANDELL.

Communicated by the Colonial Office.

Read 23rd April, 1860.

To his Excellency Sir RICHARD GRAVES MACDONNELL.

SIR,

Adelaide, April 16th, 1859.

According to your kind invitation I do myself the honour of addressing you respecting my trip with the steamer *Gemini* up the rivers Darling and Barwan.

The steamer *Gemini* left the Darling Store, near the junction of Darling with Murray, on Wednesday, February 2nd; arriving at Minindeche on the 11th, Mount Murchison on the 16th, Fort Bourke on the 20th, and Gunnawarra, a station of Mr. J. Danger's on the Barwan, on the 23rd.

On the 24th I reached "Nonah," or, as it is now commonly

called, the "Blacks' Fishing-grounds," the highest attainable point with the then existing flood. Up to this point I found no impediment to the navigation: indeed from above "Minindeche" within 80 miles (by land) above Fort Bourke, the river is particularly fine, the reaches being much straighter, broader, freer from snags, and the corners less acute than from Minindeche downwards to the junction; so much so that the *Gemini* pursued her course by moonlight as well as by day without any difficulty whatever. The obstacle presented to the navigation at Nonah is a fall at low-water and a very swift rapid at the time of the *Gemini's* visit; the descent being about 8 feet in 200 or 300 yards, and the water boiling and foaming over rocks for that distance.

It is called the Blacks' fishing-grounds in consequence of their having (assisted by natural facilities) built a great number of circular walls of stone in the bed of the river, extending from below the Falls to a distance of half a mile above.

The blacks assemble here in great numbers during the time of low-water; the neighbouring tribes suspending hostilities for the time being; and ascending the river for some considerable distance, they come down in it, making a peculiar noise, and driving multitudes of fish before them into the cells—where they are stupified by the meshes, and easily speared by the blacks stationed there for that purpose.

I believe that a passage may be very easily made through these rocks, so that steamers could ascend the rapids with the assistance of warps in seasons of moderate flood, when another 100 miles would be open to navigation, independent of the Nammoy and other tributaries, which are doubtless navigable for small steamers.

The distance traversed by the *Gemini* was 620 miles by land from the junction, or about 1800 miles by water; the highest point attained being (as near as I can make out from an indifferent map before me) in about $29^{\circ} 25'$ s. lat., and 147° E. long.—120 miles above Fort Bourke, 70 miles below the junction of the Nammoy, and about 400 miles from the New South Wales seaboard.

From Mount Murchison and Mr. Sutter's to Gunnawarra, a distance of 280 miles by land, Mr. Spence's station at Fort Bourke is the only run occupied for that distance, *although*, I am informed, *every inch is taken up*. From the Falls upwards, including the Nammoy and other tributaries, the country is *completely* occupied; stations occurring on both sides of the river every 5 or 6 miles, and heavily stocked—principally with cattle. The settlers, however, say they would immediately place sheep on their runs, instead of cattle, if there is any likelihood of their being able to avail themselves of steam to send their wools to Adelaide, and of getting their supplies from thence.

The country from Mount Murchison upwards improves in character very much, and its sheep-carrying qualities can scarcely be overrated, the grass for miles together in many of the bends being so thick and long that it can only be walked through with difficulty, and is as thick and close in the bottom as the meadows of England. The soil is much superior to any I have seen on the Murray or Murrumbidgee, and had it plenty of moisture would produce anything; but as it is, it is eminently suited to the vine and to the tropical fruits.

The timber on the Darling and Barwan for the most part is not so plentiful or fine in appearance as that found on the Murray River, but is much superior in quality; and there are many varieties eminently fitted for the cabinet-maker.

The banks of the river from Fort Bourke upwards, including Dunlop's and Rantein's Ranges, abound in a variety of beautiful flowers and botanical specimens. Some parts of the banks are thick with a native melon or cucumber—eaten by the blacks; native oranges also are plentiful, of which they are particularly fond.

I did not succeed in finding any indication of minerals; gypsum abounds in many parts, and the settlers near the barrier ranges seem quite satisfied that plenty of gold is to be found there.

I found the blacks above Mount Murchison numerous, but very quiet and inoffensive. They were terribly alarmed at the steamers, and in many instances ran away altogether. I, however, landed some Mount Murchison blacks that were on board, and sent them on ahead to tell their friends that all was right; this had the effect of inducing many to come on board. After this I had no difficulty in getting them on board, unless they vanished before we could get within hearing. On every opportunity I stopped the steamer and distributed tobacco, &c., among the different tribes, with which they were much delighted; and I have every reason to believe that they will not bolt from the next steamer that ascends the river. The whites were, however, in many instances as much alarmed as the blacks; at Mr. Spence's station at Fort Bourke, particularly, the men were quite terrified at our approach by night, and they mistook the noise of the engine for the war-cry of the blacks; and had prepared for us a warm and vigorous reception in the shape of powder and lead—indeed we were passing the station before they discovered it was a steamer: for so unlooked for and unexpected was a steamer, and so sure were they that the blacks were upon them, that they had extinguished their lights and fires, and so quietly awaited the assault that we were almost past the station without knowing we were near it.

I was received by the settlers on the Barwan with great kindness—they were highly delighted at the sight of a steamer in their

waters, and seemed fully alive to the benefits likely to accrue to them from its navigation.

The return voyage to the Junction occupied a fortnight, and the *Gemini* had taken in a second cargo for the Darling settlers from the Store, when she sank on the evening of the 11th of March, alongside the Store, from some as yet unexplained accident or carelessness.

I had left for Adelaide in the steamer *Bunyess* a few hours before the accident occurred. Upon hearing what had happened I immediately returned and loaded the *Bunyess* in lieu of the *Gemini*, and started up the Darling on the 14th of March.

The voyage to Minindeche and back to the Junction was accomplished in ten days, and in perfect safety. This last trip I think says a good deal for the navigation of the Darling—the *Bunyess* being the broadest boat afloat on the Murray waters, and the navigation to Minindeche being the most difficult by far of the whole distance traversed by the *Gemini*.

In conclusion I would beg to observe that the navigation of the Darling is capable of much improvement by damming up the backwaters, the construction of locks, &c., &c., for which the character of the river is eminently suited. A great deal may be done at once by clearing the snags out of its channel. This can be accomplished at a cheap rate compared with the Murray or Murrumbidgee, as the snags are not so plentiful, and the channel narrower than in those rivers. This last feature, however, renders it more necessary that the snags which *are* in its bed should be cleared out. I would further remark that I consider the navigation of the Darling to be of much more importance to South Australia than either of the other rivers, in consequence of its course being so far distant from either the Victorian or New South Wales seaboard, so that the whole of its trade must flow to and from Adelaide, and as I feel persuaded will prove to be of very considerable magnitude in the course of a few years.

I have the honour to be, Sir,

Your most obedient humble servant,

WILLIAM RICHARD RANDELL.

[NOTE.—Lieut.-Governor MacDonnell recalls attention to the circumstance that in February, 1859, he had undertaken an exploring voyage up the Darling with Capt. Cadell in the steamer *Albany*, and reached Mount Marchison, 600 miles by water above the junction. He had also expressed his belief that the river might be navigated still higher up, and is therefore much gratified to know that Mr. Randell has gone 120 miles by land higher up than Fort Bourke, or 1800 miles by water above the junction of the Darling and the Murray; or, in all, 2400 miles by water above the sea-mouth of the Murray. Mr. Randell, in his small steamer the *Mary Anne*, was the first, in 1853, to proceed up the Murray, and eventually reached Maiden Point.]—Ed.

IX.—*On Typical Mountain Ranges: an Application of the Calculus of Probabilities to Physical Geography.* By WILLIAM SPOTTISWOODE, Esq., M.A., F.R.S., F.R.G.S.

Read, April 23rd, 1860.

IN an elaborate memoir published in the 'Petersburg Transactions' (Series VI., tom. viii.), Dr. Abich has, among other things, illustrated the views of A. Von Humboldt and Ritter on the directions of the mountain systems which form the great plateau of Central Asia, by showing that the same views may be extended to the highlands of Western Iran. Grouping the ranges of the Caucasus, of Georgio-Armenia, and of Northern Persia, under four heads, he deduces a mean direction for each group. But, probably laying more stress upon the geological and other parts of his subject than upon these numerical calculations, he has taken only the arithmetical mean of the directions of the ranges under consideration, without reference to either their length or their elevation. I propose here to resume, with some other modifications, the calculation of a mean or typical direction, taking into account (so far as is approximately possible) the length and elevations, or, in other words, the mass of the mountains upheaved. But in so doing, my object is not so much to correct Dr. Abich's conclusions on this particular point,—which are in fact independent of the largest correction furnished by the subjoined calculations,—as to suggest and exemplify a new problem in physical geography.

It is well known that the Calculus of Probabilities enables us to deduce, from a number of discordant observations, the most probable value of the quantity observed, the probable errors of various observations, the "error to be feared" in the probable value, and the limits within which the probable value probably lies, as well as many other results of a like kind. I here regard the minor deviations of a group of mountains lying mainly in the same direction, as "errors" or deviations from a true typical direction; and calculate the other errors, probabilities, and limits as in the case of a group of observations. It is on a similar principle that the Calculus of Probabilities has been applied to questions of gunnery.

The data of the following investigations are as follow: consider the spherical triangle ABC, in which A and B are the two extremities of the range, or portion of range, under consideration, and C the North Pole. The positions of the points A and B being astronomically determined, the side c (opposite to C) is found from the co-latitudes of A and B, and their difference of longitude, by the usual formula. The direction of c , and consequently that of the range, is given by the equation

$$\begin{aligned}\theta &= \frac{1}{2} (A - 90^\circ + 180^\circ - B - 90^\circ) \\ &= \frac{1}{2} (A - B).\end{aligned}$$

The importance of the range AB in determining the typical direction of the group will depend partly upon its length, and partly upon its mass. Now, as we have not before us in detail the breadth and lateral slope of the different ranges or parts of ranges, we shall suppose,—and the supposition is perhaps sufficiently accurate for the present purpose,—that the slope is always the same; in other words, that all transverse sections are similar triangles. This being the case, the mass will always be proportional to $c h^2$, where h represents the height; or, if h_1, h_2, \dots be the heights of A and B respectively, it will be approximately proportional to $\frac{1}{4} (h_1 + h_2)^2$. This quantity is mathematically called “the weight of the observation,” and will be represented by the symbol w .

The following are the formulæ used: let $c_1, c_2, \dots c_n$, be the values of c for the various ranges of the group; $\theta_1, \theta_2, \dots \theta_n$, the angles between $c_1, c_2, \dots c_n$, and parallels of latitude drawn through the middle points of the ranges; $w_1, w_2, \dots w_n$, the corresponding masses, weights of observations, or values of w . Then the probable typical direction Θ , deduced from the above data, will be given by the formula

$$\Theta = \frac{\sum w \theta}{\sum w}.$$

Moreover, the probable errors, or deviations of the various ranges from the direction of the typical range, will be

$$e_1 = \Theta - \theta_1, e_2 = \Theta - \theta_2, \dots e_n = \Theta - \theta_n.$$

The mean error (deviation) η of an observation (range) whose weight (mass) is unity is

$$\eta = \sqrt{\frac{\sum w e^2}{n-1}}.$$

The mean errors of $\theta_1, \theta_2, \dots \theta_n$, respectively, or the “errors (deviations) to be feared” will be

$$e_1 = \frac{\eta}{\sqrt{w_1}}, e_2 = \frac{\eta}{\sqrt{w_2}}, \dots e_n = \frac{\eta}{\sqrt{w_n}},$$

and the mean error E (deviation) of Θ , or “error (deviation) to be feared,”

$$E = \frac{\eta}{\sqrt{\sum w}}.$$

So that Θ will lie between the limits $\Theta \pm E$.

From the various groups considered by Dr. Abich I offer only one example, because the others scarcely contain observations (ranges) sufficiently numerous to give valuable results. In this case θ is measured positively from east southwards, from west northwards, and negatively in an opposite direction. The longitudes are east from Ferro. B' is the exterior angle of which B is

the interior. The value of c is given in geographical miles; that of h in feet.

EAST AND WEST RANGES IN GEORGIA-ARMENIA.

Name of Mountain	Latitude.			Longitude.							
	°	'	"	°	'	"	°	'	"		
Gorobani ..	41	52	10	62	20	45	B' = 94	2	42	$h_1 = 3,180$	$c = 5.8$
Yalno ..	41	50	46	62	48	23	A = 93	44	16	$h_2 = 6,020$	(1)
Nageba ..	41	50	11	60	34	36	B' = 91	57	53	$h_2 = 8,559$	$c = 2.79$
Metizehari ..	41	50	33	60	19	37	A = 91	47	53	$h_2 = 9,350$	(2)
Tioneti ..	41	44	50	62	7	58	B' = 90	22	42	$h_1 = 6,110$	$c = 5.8$
Ardjewan ..	41	44	45	61	36	53	A = 90	2	0	$h_2 = 8,810$	(3)
Ljalwar ..	41	9	16	62	14	37	B' = 88	20	22	$h_1 = 8,420$	$c = 12.5$
Uch Talpalar	41	7	30	61	8	15	A = 87	36	43	$h_2 = 9,790$	(4)
Margeoz Dagħ	40	43	10	62	55	17	B' = 86	32	17	$h_1 = 9,980$	$c = 7.29$
Tech Achmet	40	41	18	62	16	54	A = 86	7	15	$h_2 = 10,230$	(5)
Murov Dagħ	40	16	49	64	0	23	B' = 93	41	18	$h_1 = 12,290$	$c = 4.47$
Kundur Dagħ	40	18	33	63	37	3	A = 95	26	13	$h_2 = 11,080$	(6)
Mychtiukan	39	53	20	63	45	44	B' = 95	42	18	$h_1 = 11,880$	$c = 4.76$
Kyrch-Kiss ..	39	53	29	64	10	27	A = 95	26	37	$h_2 = 9,350$	(7)
Mychtiukan	39	53	20	63	45	44	B' = 102	6	19	$h_1 = 11,880$	$c = 11.32$
Goedel-Dara	40	0	46	63	12	10	A = 101	44	45	$h_2 = 11,710$	(8)
Ararat ..	39	42	11	61	57	43	B' = 94	41	21	$h_1 = 16,940$	$c = 4.8$
Sor Dagħ ..	39	43	28	61	36	58	A = 94	28	3	$h_2 = 10,660$	(9)
Agri Dagħ (1)	40	2	13	60	55	39	B' =			$h_1 = 9,051$	$c = 8.78$
Ditto (2)	40	1	35	60	51	45	A =			$h_2 = 9,184$	(10)
Geschasar ..	38	49	27	64	53	9	B' = 94	51	11	$h_1 = 10,310$	$c = 7.41$
Kamku Dagħ	38	47	14	63	31	13	A = 93	5	28	$h_2 = 9,670$	(11)
Sahalan ..	38	16	9	65	30	3	B' = 98	8	57	$h_1 = 15,000$	$c = 7.94$
Kaschka Dagħ	38	20	32	64	49	58	A = 97	44	7	$h_2 = 10,310$	(12)

From these we deduce the following tables; wherein w has been divided throughout by 10,000, which is equivalent to taking the heights to the nearest 100 feet; and $w \theta$ is expressed in seconds.

$\theta_1 = 3$	53	29	$w_1 = 12,272$	$\sqrt{w_1} = 110.7$	$w, \theta_1 = 171,920,904$
$\theta_2 = 1$	52	53	$w_2 = 22,599$	$\sqrt{w_2} = 150.3$	$w, \theta_2 = 153,063,027$
$\theta_3 = 0$	12	21	$w_3 = 32,625$	$\sqrt{w_3} = 180.6$	$w, \theta_3 = 24,175,055$
$-\theta_4 = 2$	1	28	$w_4 = 103,512$	$\sqrt{w_4} = 321.7$	$-w, \theta_4 = 754,397,000$
$\theta_5 = 3$	40	14	$w_5 = 74,365$	$\sqrt{w_5} = 269.5$	$w, \theta_5 = 982,662,222$
$\theta_6 = 5$	33	45	$w_6 = 61,190$	$\sqrt{w_6} = 247.3$	$w, \theta_6 = 1,225,320,817$
$\theta_7 = 5$	35	27	$w_7 = 54,407$	$\sqrt{w_7} = 233.4$	$w, \theta_7 = 1,096,863,020$
$\theta_8 = 11$	55	32	$w_8 = 157,619$	$\sqrt{w_8} = 397.0$	$w, \theta_8 = 6,766,916,316$
$\theta_9 = 4$	34	41	$w_9 = 91,411$	$\sqrt{w_9} = 302.3$	$w, \theta_9 = 1,506,545,206$
$-\theta_{10} = 5$	56	40	$w_{10} = 74,314$	$\sqrt{w_{10}} = 272.2$	$-w_{10}, \theta_{10} = 1,590,322,222$
$-\theta_{11} = 3$	58	19	$w_{11} = 74,100$	$\sqrt{w_{11}} = 272.2$	$-w_{11}, \theta_{11} = 1,039,547,619$
$\theta_{12} = 7$	56	32	$w_{12} = 128,061$	$\sqrt{w_{12}} = 357.8$	$w_{12}, \theta_{12} = 3,661,358,416$

Whence $\Sigma w = 886,565$, $\Sigma w \theta = 12,204,558,142$, $\sqrt{\Sigma w} = 941.6$

$\theta = 3^\circ 49' 26''$.

It may here be noticed that Dr. Abich's arithmetical mean is $2^{\circ} 26' 32''$, giving a difference of $1^{\circ} 22' 54''$.

$e_1 = 0$	i	n	$e_7 = 1$	i	n
$-e_2 = 1$	56	23	$e_8 = 8$	6	6
$-e_3 = 3$	37	5	$e_9 = 0$	45	15
$-e_4 = 5$	50	54	$-e_{10} = 9$	46	6
$-e_5 = 0$	9	12	$-e_{11} = 7$	47	45
$e_6 = 1$	44	19	$e_{12} = 4$	7	6

Whence—

$\pi = 9$	i	n	$e_7 = 0$	i	n
$e_1 = 0$	5.2		$e_8 = 0$	1.4	
$e_2 = 0$	3.8		$e_9 = 0$	1.9	
$e_3 = 0$	3.2		$e_{10} = 0$	2.1	
$e_4 = 0$	1.8		$e_{11} = 0$	2.1	
$e_5 = 0$	2.1		$e_{12} = 0$	1.6	
$e_6 = 0$	2.3		$E = 1$	1.4	

And Θ lies between $3^{\circ} 50' 37''.4$ and $3^{\circ} 48' 34''.6$.

In reference to the foregoing investigations, the question will naturally arise, what degree of confidence can we attach to our conclusion of a typical range inclined at an angle $3^{\circ} 49' 36''$, or at all events somewhere between the limits $3^{\circ} 50' 37''.4$ and $3^{\circ} 48' 34''.6$, to the parallel of latitude passing through it? Is there any good reason for supposing that such a range may be taken by the physical geographer as a true representative of the group under consideration? In the instance before us, owing mainly to the small number of observations, and to the severity of the test to which we subject them, the assurance we receive is but moderate in degree; but the test is a necessary one, the assurance is of a positive character, and the investigations at all events will exemplify the problem here suggested. The answer to the above questions is to be found in the following tables.*

In the first table the first column indicates how far the direction of each range deviates from that of the typical range calculated; east-southern deviations being reckoned positive, and east-northern negative. The second column gives the relative "weight" which each range has had in determining the typical direction. The third column gives the corresponding numbers, if the total "weight" has been represented by 1000; so that each number in the third column represents, according to experiment, the number of chances out of a thousand, or the probability which each corresponding variation in the first column has in its favour. The fourth

* I have followed a method of Quetelet, and in several places have adopted his own words.

column has been formed by means of the third in the following manner. From the number 500 written at the top of this column there has been deducted the number 178, placed opposite in the third column; and from the remainder, 322, there has been deducted the number 144, placed opposite in the third column; and so on to a remainder 48. A similar process has been applied from the bottom of the column.

TABLE I.

Difference in Direction by Variations from the Mean.	Weight of Observations.		Probability of the Variations according to Observation.	Rank of preceding Numbers in Scale of Precision.
	Absolute.	Relative.		
292	158	178	·500	..
148	128	144	·322	14·5
64	54	61	·178	7·25
63	61	69	·117	4·75
27	91	103	·048	2
..	..	..	·055	2·20
2	12	13	·068	2·75
- 6	74	84	·152	6·20
- 70	23	26	·178	7·33
-130	33	37	·215	9·
-211	104	117	·332	14·75
-281	74	84	·416	21·75
-352	74	84	·500	..
..	886	1000	..	..

It will be observed that, in performing the subtraction from the positive end, we cannot proceed beyond the remainder 48. This remainder expresses one part of the observations which enter the group 27"; the other part is represented by 55, derived from the negative end. The two together make up 103, as they should. This sum is, in other words, the "weight" of the ranges lying between $27'' \times \frac{1}{4} (63'' - 27'') = 27'' - 18'' = 45''$, and $27'' - \frac{1}{4} (27'' - 2'') = 27'' - 12''\cdot5 = 14''\cdot5$. The two parts should theoretically have turned out in the proportions 18:12·5. These facts indicate that the mean has been calculated somewhat too low, and that it should have been between 2" and 27" higher, but nearer to the latter value than the former. This correction, it should be noticed, lies within the limits of probable error $E = 0^{\circ} 1' 1''\cdot4$, calculated above.

In the last column are given the results of comparing the numbers in the third with a "general scale of precision," so as to ascertain the places they occupy. The numbers in a general scale of precision, such as here used, are half the probabilities of showing at least 499,498, &c., and not more than 500,501, &c., balls of a given colour in 999, drawn from an urn containing an infinite number of balls in equal proportions of black and white. Thus ·048, or rather a number very near to it, is found in the second place of

such a table, and .215 in the ninth. The other numbers in the fourth column are found to lie intermediate between the various places in the Table of Precision. It is in this fifth column that we may see whether the directions of the ranges proceed with regularity, and whether they vary from that of the typical range in conformity with the indications of theory. Theoretically the differences of the numbers in this fifth column should be nearly equal, except for the extreme terms; and although this is not strictly the case here, we may still represent the column with tolerable accuracy by a double arithmetical progression whose first term is 2, and whose difference is 4.25 in either direction.

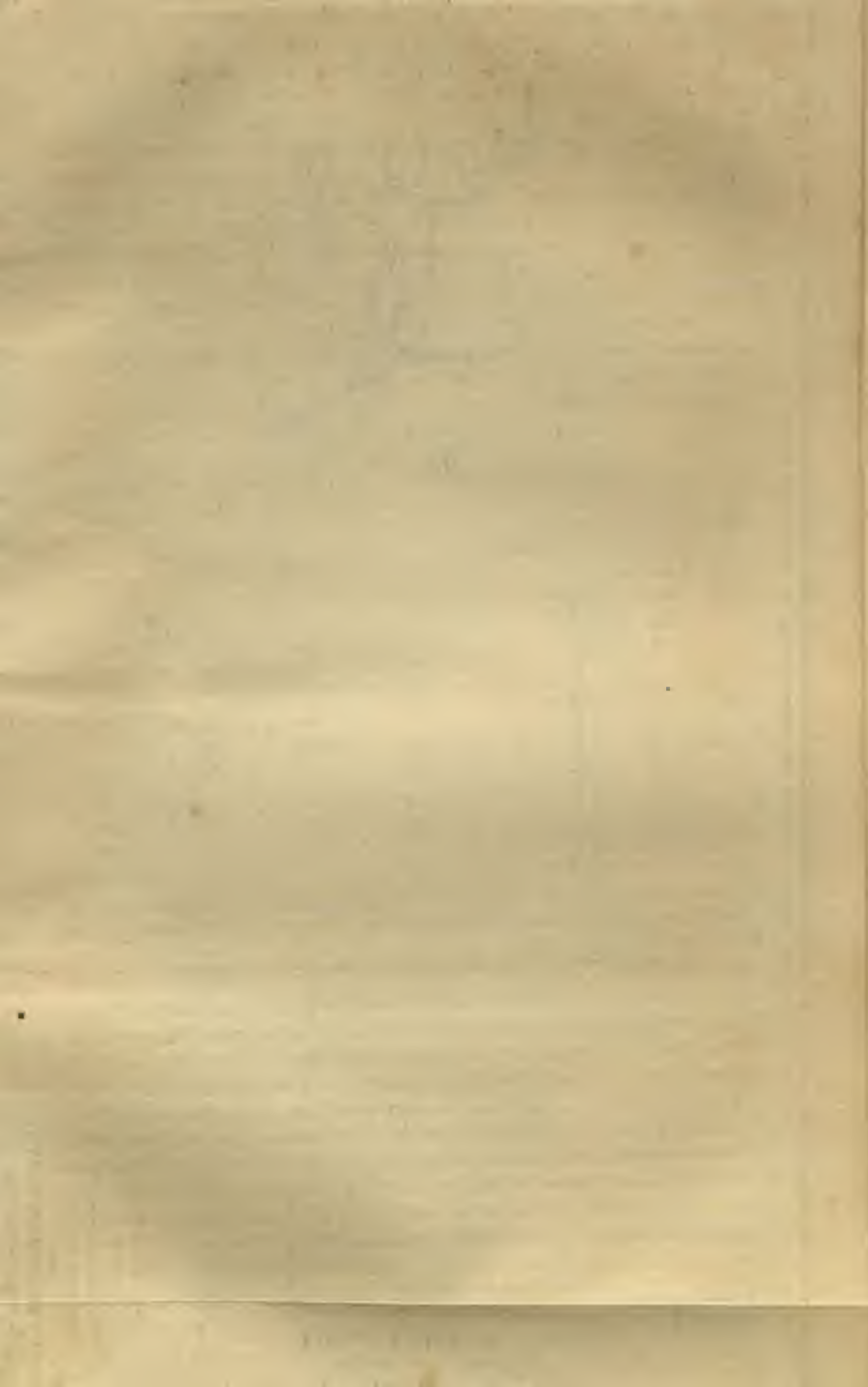
Lastly, proceeding on this basis we may form the following Table:—

TABLE II.

Difference in Direction by Variations from the Mean.	Rank according to Calculation.	Probability of Variations according to		Weight of Observations.	
		Calculation.	Observation.	By Calculation.	By Observation.
"	"	.500	.500	168	173
292	"	.332	.332	86	144
148	14.75	.246	.178	92	61
64	10.5	.154	.117	102	69
63	6.25	.050	.048	104	103
27	2	.057	.068	18	13
2	2.25	.160	.152	103	84
- 6	6.5	.252	.215	92	63
- 70	10.75	.339	.332	87	117
- 130		.389	.416	50	84
- 211	15	.500	.500	111	84
- 281	19.25				
- 332	"				

The agreement of calculation and experience, as exhibited by a comparison of the third column of this table with the fourth, and of the fifth with the sixth, although not perfect, is yet sufficiently approximate to justify the conclusion that, the various mountain ranges which we have been considering do point to a common type, that their directions are not accidental, and that the geologist and the physical philosopher will at least have good grounds for seeking some common agency which has caused their upheaval.

In this way the Calculus of Probabilities, though one of the most abstract and refined branches of mathematics, and in itself incapable of interpreting any natural phenomena, may still serve as a check and a guide to the physical philosopher, by pointing out where he may and where he may not employ his study of causes with reasonable hope of a successful result.





X.—*Proposed Railway Route across the Andes, from Caldera in Chile to Rosario on the Parana, via Cordova; with Report of Mr. E. A. Flint's Survey.* By W. WHEELWRIGHT, Esq., F.R.G.S.

Read, January 23rd, 1860.

HAVING been engaged for several years in introducing and constructing railways in Chile (which is a broken and mountainous country), it became necessary to adopt a system of steep gradients and sharp curves, in order to accomplish these objects economically.

In the year 1842 I proposed to the Government of Chile the construction of a railway from Valparaiso to Santiago, a distance of 110 miles, and to extend it afterwards to Talca and Talcahuano. After repeated surveys, a line was obtained over the first-named route with practical gradients, and these railways are now in progress.

In 1849 I undertook and had constructed a railway from the port of Caldera, in the north of Chile, to Copiapo, a distance of 50½ miles, with a maximum gradient of 60 feet per mile, and terminating at an elevation of 1327 feet above the sea.

In 1854 I projected and had carried out a railway from the city of Copiapo to Sabellon, a distance of 25 miles, with a maximum gradient of 63 feet per mile and a total elevation of 2193 feet above the sea.

The same year (1854) I undertook and had surveyed a continuation of the line from Sabellon to Chanarcillo, a distance of 26½ miles, surmounting an elevation of 4470 feet above the sea, with a maximum gradient of 250 feet per mile. This railway is about being completed.

At the same time I projected another railway, 60 miles long, from Copiapo to the great northern mining district of Tres Puntos, with a maximum gradient of 152 feet per mile, and with an elevation of 6600 feet above the level of the sea at the terminus.

Having been thus far successful, I was induced to entertain the hope that practical gradients might be had across the Andes to the plains of Buenos Ayres, and I resolved to employ and organise a corps of engineers for this object.

As a preliminary step, I engaged the services of Don Nicholas Naranja, as pioneer, to take barometrical observations on his journey across (he being on his way to England *via* Buenos Ayres), to send me his report, and also to inform me how far the road was available for a carriage, as I intended to accompany the expedition with my family and meet him at Cordova. Unfortunately the gentleman to whom I had confided the enterprise was called away, and I was reluctantly compelled to abandon the expedition.

Señor Naranja, however, fulfilled his part to my entire satisfac-

tion: his observations were accurate, the positions and elevations of the salient points were distinctly shown, and his report was highly interesting, and demonstrated the possibility of a railway route.

An undertaking of such magnitude as the construction of a railway over the Andes, at an elevation of 16,000 feet above the sea, was difficult to contemplate; but I was encouraged by the experience I had acquired and the prospect of the immense benefits which my success would confer on the South American States, whenever it should be completed.

I had also to form a company for the construction of a railway from the city of Cordova to the port of Rosario, on the Parana; its terminus being thus in conjunction with the Atlantic.

The entire distance from the Pacific to the Atlantic by the proposed route is about 1000 miles, which may be divided into the following sections, viz.:—

	Miles.
1st. Rosario to Cordova	250
2nd. Cordova to the eastern base of the Andes or Fiambala	350
3rd. The eastern base of the Andes to the junction with the Tres Puntos Railway	320
4th. The junction with the Tres Puntos Railway to Caldera	80
Total length	1000 miles.
Rosario, lat. $32^{\circ} 56'$ S., long. $61^{\circ} 30'$ W.	
Caldera, lat. $27^{\circ} 3'$ S., long. $70^{\circ} 55'$ W.	

I will now examine these sections in their order.

FIRST SECTION—Rosario to Cordova, 250 miles.—As this portion of the line has been surveyed by Allan Campbell, Esq., I must refer to his Report for particulars.*

The Government of the Argentine Confederation has granted to the Company six miles of land in breadth throughout its entire length. This land is arable and capable of producing cereals, fruits, vegetables, and a superior kind of cotton. It is not excelled as a pastoral or grazing country, and its value must be greatly improved by a railway passing through its centre.

Mr. Campbell has shown in his Report that there is every prospect of its becoming a successful and remunerative line.

SECOND SECTION—Cordova to the Eastern base of the Andes, 350 miles.—This section is a gradually rising plain, similar in many respects to that of the First Section.

While the First Section embraced the province of Entre-Rios and extended to the centre of the province of Cordova, with Buenos

* This Report has not been received by us, but by a tracing of the line, it appears to pass from Rosario on the Parana to Esquina, and thence along the high road to Cordova, and thence to La Rioja, near by the line passed by Mr. French in 1826, and laid down on the Map which accompanied his very interesting Paper on the Province of La Rioja, printed in Vol. ix. of this Journal.

Ayres on the south and Santa Fé on the north, this Second Section is continued through the western part of Cordova, Rioja, and Catamarca, and will concentrate the trade of Jujuy, Salta, Tucuman, and Santiago on the north, and that of Mendoza, San Juan, and San Luis on the south; thus showing the central position of the railway as to the whole of the provinces.

Now, without reference to any foreign traffic, we have here 600 miles of railway passing through the centre of this vast region abounding in agricultural, pastoral, and mineral wealth, and forming a grand trunk line at an expenditure which, according to estimates, will not exceed 6000*l.* per mile; and, if we deduct therefrom the value of the lands conceded, the cost of the railway will be greatly reduced: the total concession being 3600 square miles, or 2,304,000 square acres.

THIRD SECTION—*The Eastern base of the Andes to the Junction with the Tres Puntos Railway, 320 miles.*—This section is barren and waste, though without doubt rich in mineral wealth, which the railway will develop, but at first must depend for revenue principally from the intercommunication between the eastern and western sides.

Before closing, I may observe that although further investigations may lead to the discovery of a still more favourable route than that proposed, there is one great feature in the Pass of San Francisco which deserves special mention, viz., that travellers cross at all times and seasons over this route, and during the last nine years that I have been connected with Copiapo I have never known it to be closed by snow. I may also quote the opinion of Don Jose Antonio Moreno (a gentleman with whom I have had much intercourse and from whom I have received most accurate information upon all occasions), who has assured me that it offers no difficulty whatever in regard to the snow (probably arising from local circumstances which prevent its drifting).

The following is an extract from the Report and Survey referred to in the foregoing statement by Mr. Wheelwright:—

“According to the tabular section of our survey from Copiapo across the Cordillera, annexed to this Report, it will be seen that the first point at which the gradient begins to assume a serious character is at the junction of the San Andres and Paipote valleys. Here we find water and vegetation, and for 10 miles the surface of the ground is much cut up and broken by the stream passing through it and by the débris from the small ravines on either side. Until we reach Maricunga, after leaving the 10th mile, we find but little or no vegetation and no obstruction to a railway, with the exception of a possible tunnel, 500 feet in length. This tunnel might be found to be unnecessary upon further inspection. Just beyond Maricunga commence the most serious gradients, and a tunnel of more than half a mile in length will be needed to pass

from Moreno's valley to the main valley; but the rest of the work to the 'Cuesta de los Chilenos' will be trifling. To pass the Cuesta another tunnel will be needed on a grade of 100 feet to the mile, and its length, for the purposes of estimating, might be stated at 2 miles, although I am inclined to think that an instrumental location would reduce it one-half. We are now on the central plateau of the Andes. From Laguna Salada to the Rio Llama we rise for 18 miles at the rate of 2 feet per mile, and then, according to the table, we have a gradient of 619 feet per mile for 3 miles. This, however, could easily be reduced to 200 feet per mile by projecting the line further to the south and following the bank of the stream—thus increasing the length to 9 miles instead of 3 miles, as it now stands. This heavy gradient has been necessary to reach the plains of Tres Cruces, about 30 miles long and 10 miles broad. We pass through the centre of them over a gently rolling surface for 10 miles, when we bear more to the eastward for the 'Barancas de las Llamas.' These barancas are a spur from the Las Llamas mountains, and extend quite across the plain to the Volcanic range on the other side, and serve as a barrier between the Tres Cruces and Las Llamas plains. In order to rise from one plain to the other, heavy works and rather abrupt gradients would be needed; but an instrumental survey would be necessary to determine the character of this work. From this point we fall gradually to the 'Barancas Blancas,' and then rise again to 'Laguna Verde,' the level of which I have assumed at 14,921 feet above the sea.

"Although the road just described is perfectly practicable, yet a preferable location for gradients, though a more expensive one, could be obtained by keeping more to the north and skirting the base of the Volcanic range with a gradually ascending gradient, and thus overcome part of the rise of the pass of 'San Francisco.' But assuming that it is necessary to pass the level of 'Laguna Verde,' we then have an average rise to the summit of the pass of but 66 feet per mile for $16\frac{1}{2}$ miles. The descending gradient from here to the 'Punto del San Francisco' is 180 feet to the mile; but as the location of the railway would be to the north, keeping up along the base of the mountains, an average gradient of 140 feet per mile would be sufficient, while the extreme gradient for overcoming this pass on a straight line, or in other words, the natural rise of the ground, is in no place over 300 feet per mile. From the great width of the pass it is but reasonable to suppose that the gradient could be much reduced by location.

"From 'El Punto del San Francisco' to Fiambala we find no impediment, with the exception of the passage of the Angostura of the 'Las Losas' river, where the stream descends rather abruptly for 5 miles. But I am led to think that a more thorough exami-

nation of the country would endorse the opinion that a better line could be found by leaving the valley of Las Losas at Chouchonil and following another valley that joins the Fiambala valley a short distance above Copacabana, at a town called Puesto.

"I would mention, before closing this description, that we examined the Las Losas Pass, which is about 18 miles from the San Francisco, and although practicable, it is more expensive and not so favourable as the latter. An examination was also made of the Piedra Parada road from Cassadero to Fiambala, without developing any favourable features. This line is next to impossible, as the length of the tunnel required would be 9 miles.

"Gradients of 300 and 500 feet per mile have been worked successfully for some years past with locomotive power, and that also in a country where the snow and ice offer serious impediments. Let us assume the gradient on the 5 miles of line at Maricunga at 480 feet per mile, or 1 foot rise in 11 feet, then $\frac{2000}{11} = 203$; add to this 8 lbs. for friction, and we have 211 lbs. per ton as the amount of force necessary to move 1 ton. According to the experience on the Virginia road, one-sixth of the weight on the driving-wheels can be taken as the effective force, in all weathers, of the locomotive. Assuming our locomotive at 36 tons, and built without trucks, so that the whole weight would be thrown upon the drivers, and carrying its water and fuel upon the top of the boiler, we have 6 tons, or 13,440 lbs. as its effective weight $\frac{13440}{211} = 63$ tons — the load a 36-ton engine without tender could haul over this gradient in all weathers. Thus we see that with a locomotive of this description we can safely rely upon three loaded freight cars passing over these 5 miles at a speed of 5 miles an hour, and allowing 10 working hours per day, one engine could transport over this incline 300 tons of merchandise daily. In this calculation I have made no allowance for curvature, as nothing but absolute location can decide what radii will be necessary.

"I would call attention to the fact that from the Pass of San Francisco to Copiapo the force of gravity could be used as the motive power, and as the freight would principally be in that direction, the gradients would be less objectionable; cattle, sheep, and metals always passing down, while the lighter goods and passenger traffic would depend upon locomotive power.

"The geological and mineralogical deposits of the mountainous districts through which this survey has been conducted may be described as follows:—From Copiapo to the Paipote gate we pass through a rich copper district, and the names of the Ladrillo Garin and Puquios Minerales are not unknown. From this point to the Portezuelo de los Chilenos the country has been but little explored, yet stones were shown me, some rich in copper and others in lead mixed with silver. From the general appearance of the hills, copper

should be the predominating metal. I was also promised some specimens of coal; but I am inclined to place but little confidence in the existence of this mineral, principally because of the igneous formation of the country.

"The Chile Cordilleras are divided into two distinct ranges. In the province of Atacama the first range is distant about 40 miles from the coast, and the second about 140 miles. The intervals between these two ranges are occupied by elevated plains, like that between Chanarcillo and Huasco.

"The two ranges of mountains form three distinct geological groups.

"1st. Extending from the sea to the eastern base of the coast range is of the same formation as the Upper Cordilleras.

"2nd. From 20 to 40 miles in width lies in the basin formed between the coast range and the Upper Cordilleras, and overlies the granitic and igneous rocks which probably extend from the coast to the main range. The original formation of this basin was probably shales and argillaceous limestones, which by contact with the igneous rock below and adjoining have become metamorphic porphyries of every colour and description, but usually retaining the stratification of the original formation, although much disturbed by the irruption through them of the underlying igneous rock.

"3rd. Consists of the tertiary and alluvium deposits which were formed subsequently to the upheaval of the mountain ranges. These are found overlying the igneous rock near the coast, part of the stratified formation of Group II. and the metamorphic porphyry of the Upper Cordilleras. Many shells of species now existing in the ocean are found embedded in this group.

"Gold and copper without silver are found in the igneous rocks of Group I. Silver and argentiferous copper in the limestones of Group II.—silver predominating in the limestones and copper in the porphyries. The ores of lead and zinc are frequently found, particularly Galena and Blende; but are not rich in silver, one specimen found on the survey yielding but 30 marks from the assay.

"The Middle Cordilleras are of the igneous formation, and generally unstratified. Sulphur abounds, and is said to be quite pure. On our journey we passed two mountains with many hundred acres of their surface covered with this deposit, while yet another mountain was white with alum. Salt, with which Copiapo is supplied, is taken from the 'Laguna Salada,' on the east side of the 'Portezuelo de Los Chilenos, and, after five days' journey with mules and one day's cartage, is sold in Copiapo at 250 dollars per 100 lbs. This salt could be delivered at Los Chilenos for 50 cents. per 100 lbs., and the action of gravity alone would take it to Copiapo on the railway. The supply is almost inexhaustible, there being at least 50 square miles, or about 150,000 tons on hand, while the formation is perpetually going on.

"The Argentine slope of the Cordilleras, as far as our journey extended, was very similar in its formation to that of Chile—of the same igneous character, and generally granitic. Peculiar species of this rock, of a more or less brilliant red, are found in abundance from Los Piladas to Fiambala; and in many instances a beautiful sandstone, of a similar colour or even still darker, like the Portland freestone, is found joined with it. This stone is stratified and could be easily quarried and used to advantage in the construction of the railway as a building stone.

"The mountains on this slope have been very imperfectly examined for minerals. I was fortunate enough to meet with a 'Cateador' at the 'Punto del San Francisco,' who was in search of a silver 'derotero,' notes of which had been left by the same Spaniard, who was acquainted with the existence of 'Tres Puntas' and the 'Ola.' During his wanderings he had found numbers of copper-veins and veins of other metals with which he had no acquaintance. He also informed me of one vein, 5 feet wide, that answered to the description of coal; but he had never tried any of it with fire. The copper could be worked to advantage with a railway; but at present it is too distant from the sea to be of any use.

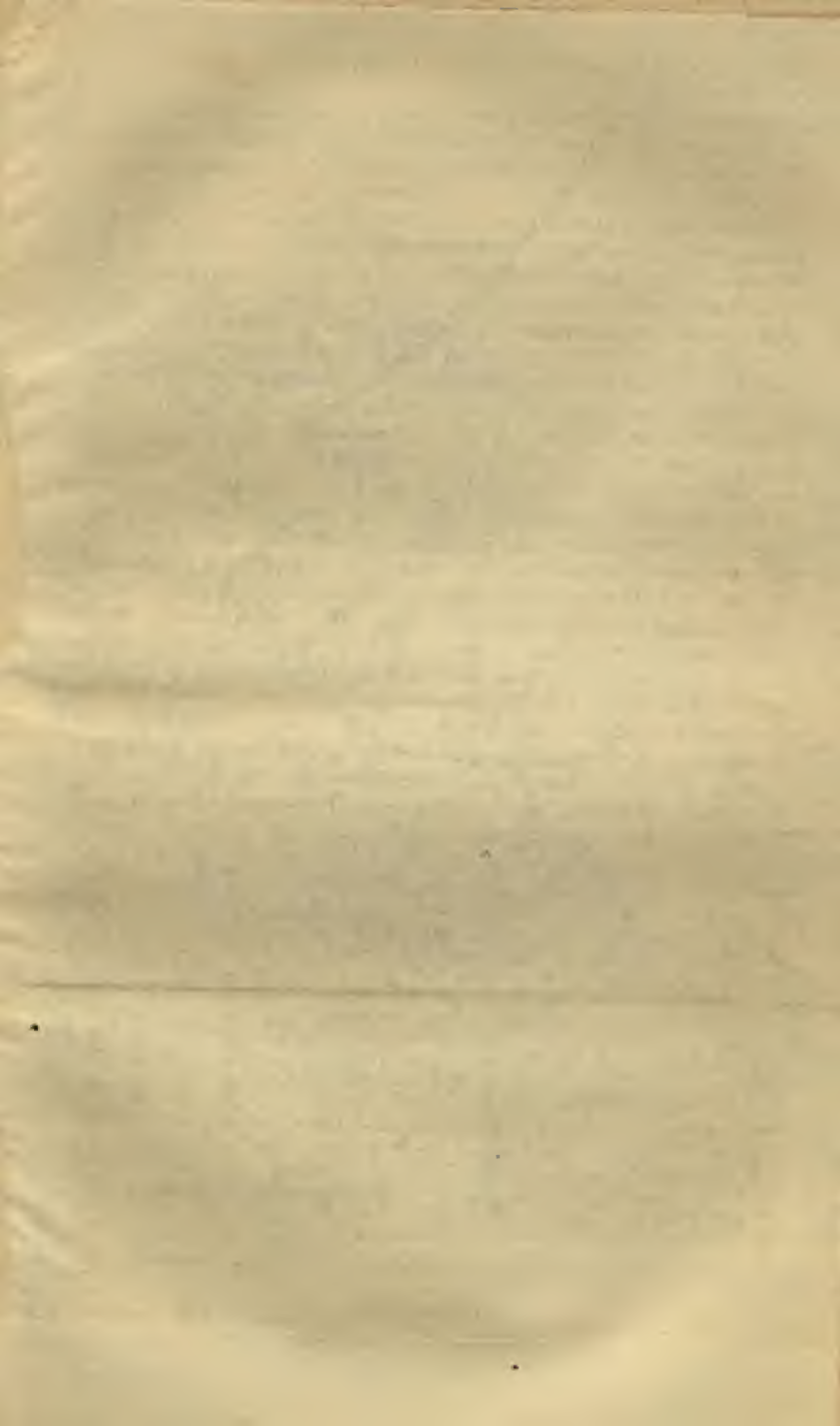
"The soil from the Copiapo River to the summit of the Chile Cordilleras is generally sand and gravel, while sufficient earthy matter exists from 'La Puerta del Paipote' to 'Los Chilenos' to support a scanty vegetation, generally a rank grass, similar to that found in salt marshes on the seacoast. The plateau of the Middle Cordilleras is covered with sand and gravel, mixed with volcanic stones, more or less silicious. Grass of the same quality is found where fresh water exists, and also another species, called *Pasto Blanco*, is sparsely scattered over the plains, furnishing food for the vicuñas and guanacos. The soil on the Argentine slope is also sand and gravel—the former predominating in the valley of the 'Fiambala,' and is of a whitish-grey colour, similar to the sea-beach sand, while gravel is the characteristic of the valley of 'Las Losas.' Owing to the greater abundance of water on the eastern slope, vegetation is quite abundant even at the height of 14,000 feet above the sea. At the Punto del San Francisco we found extensive salt-marshes abounding in grass, while even at the summit of the pass the 'Cuerdo de Cabra' furnishes an abundance of firewood of the best quality. At Cascadero extensive pastures, 3 and 4 miles in width, commence, and from here to Fiambala there is no lack of vegetation, grass growing in profusion and the small shrubs of the higher altitudes assuming the appearance of trees. We recognised the 'Alga Roba' and Chañar, and were informed that below Fiambala they were of sufficient size to be used for railway sleepers. At Fiambala the soil has all the strength and luxuriance natural

to the tropics, at the same time bearing in profuseness the cereals of the more temperate zone, and this, too, without cultivation. The seeds are simply placed in the ground, and no more thought is given to them till the time for harvesting arrives. In fact, we have now arrived at that rich plateau which reaches to the Atlantic Ocean, and although the land still falls toward the east and the mountains hem it in on either side, yet so far as the vegetation is concerned it can be considered as a spur from those immense pampas that extend from the eastern base of the Andes to the sea.

"The climate from Copiapo to Los Chilenos is dry, but growing colder as higher altitudes are reached. Snow falls at 'La Puerta del Paipote' to some extent, and at Los Chilenos it is not uncommonly 2 feet in depth during the winter months; but, owing to the power of the sun and the rarity of the air, it seldom lasts more than one or two days. On the plains of the Cordillera the atmosphere is very rare, often producing pain in the head and nausea, while active exercise is attended with difficulty in respiration. Snow and hail storms are frequent in May, June, and July, and not uncommon in April and August; but, owing to the power of the winds, but a small portion remains upon the plains. On the Argentine slope snow sometimes banks up in the small valley to a height of 15 feet; but on the road by which we passed there is no fear of any impediment of this sort. The climate on this side is more humid than at the same altitudes on the Chile side, rain being quite common at an elevation of 13,000 feet, while at Fiambala, during the winter months, it falls in abundance. I am however led to infer, both from observation and conversation, that the danger to a railway from large freshets would be trifling."

From					To					Miles.
Copiapo ..	..	..	..	..	San Andres ..	..	..	..	..	65
San Andres ..	..	..	..	..	El Bolo ..	..	..	..	..	10
El Bolo ..	..	..	..	..	Maricunga ..	..	..	..	..	24
Maricunga ..	..	..	..	..	Los Chilenos ..	..	..	..	..	8
Tunnel ..	..	..	..	..	3,000 feet, at 250 dollars per foot					6
Ditto ..	..	..	..	..	10,500 feet, ditto					2
Ditto ..	..	..	..	..	Laguna Salada ..	..	..	..	..	7
Laguna Salada ..	..	..	..	..	Rio Llama ..	..	..	..	..	18
Rio Llama ..	..	..	..	..	Tres Cruces ..	..	..	..	..	9
Tres Cruces ..	..	..	..	..	Barancas de Las Llamas ..	..	..	..	..	15
Barancas de Las Llamas ..	..	..	..	..	5-mile Station ..	..	..	..	..	5
5-mile Station ..	..	..	..	..	Laguna Verde ..	..	..	..	..	24
Laguna Verde ..	..	..	..	..	San Francisco ..	..	..	..	..	16½
San Francisco ..	..	..	..	..	Punto S. Francisco ..	..	..	..	..	13½
Punto S. Francisco ..	..	..	..	..	30-mile Station ..	..	..	..	..	30
30-mile Station ..	..	..	..	..	Chouchuil ..	..	..	..	..	50
Chouchuil ..	..	..	..	..	Fiambala ..	..	..	..	..	40
										6

Total Distance 352·6





MAP OF THE MOUNTAINS OF LLANGANATI IN THE QUITONIAN ANDES

by Hans Christian Andersen

To illustrate a Paper by Richard Green Esq^r

First for the Journal of the Royal Anthropological Institute, Vol. 1, 1871, p. 100.

XI.—*On the Mountains of Llanganati, in the Eastern Cordillera of the Quitonian Andes, illustrated by a Map constructed by the late Don Atanasio Guzman.* By RICHARD SPRUCE, Esq.

Communicated by SIR W. J. HOOKER, F.R.G.S.

Read, March 12th, 1860.

IN the year 1857 I travelled from Tarapoto, in Peru, to Baños, in Ecuador, along the rivers Huallaga, Marañon, Pastaza, and Bombonasa to Canelos, and thence overland through the forest to Baños—a journey which occupied me exactly a hundred days. At the Indian village of Andoas, near the confluence of the Bombonasa with the Pastaza, a distant view is sometimes obtained of the Andes of Quito, but during my stay there the sky was too much obscured to allow of any but near objects being seen. On the 21st of May I reached Paca-yacu, below Canelos, and was detained there three weeks in getting together Indians for conveying my goods through the forest, and procuring the necessary provisions for the way. This village stands on a plateau elevated 240 feet above the river Bombonasa, and about 1800 feet above the sea. In fine weather there is a magnificent view of the Cordillera, looking westward from the plateau, but I saw it only once for about a couple of hours in all its entirety. It takes in an angle of about 60°, bounded left and right by forest on adjacent elevations. At my feet lay the valley of the Bombonasa, taking upwards a north-westerly direction; the stream itself was not visible, and audible only when swollen by rains. Beyond the Bombonasa stretched the same sort of boldly undulated plain I had remarked from Andoas upwards, till reaching one long low ridge of remarkably equable height and direction (north to south): this is the watershed between the Bombonasa and Pastaza, and the latter river flows along its western foot. A little northward of west from Paca-yacu the course of the Pastaza bends abruptly, and is indicated by a deep gorge stretching westward from behind the said ridge. This gorge has on each side steep rugged hills—spurs of the Cordillera—of from 5000 to 7000 feet high; one of those on the right is called Abitagua, and the track from Canelos to Baños passes over its summit. All this was frequently visible, but it was only when the mist rolled away from the plain, a little after sunrise, that the lofty Cordillera beyond lay in cloudless majesty. To the extreme left (south) rose Sangáy, or the volcano of Macas, remarkable for its exactly conical outline, for the snow lying on it in longitudinal stripes (apparently of no great thickness), and for the cloud of smoke continually hovering over it. A good way to the right was the loftier mountain called “El Altar,” its truncated summit jagged with eight peaks of nearly equal elevation, and

clad with an unbroken covering of snow, which glittered in the sun's rays like crystal—an altar to whose elevated purity no mortal offering will perhaps ever attain.* Not far to the right of El Altar, and of nearly equal altitude, stood Tunguragua, a bluff irregular peak with a rounded apex capped with snow, which also descends in streaks far down its sides.† To the right of Tunguragua and over the summit of Abitagua appeared lofty blue ridges, here and there pointed with white, till on the extreme right was dimly visible a snowy cone of exactly the same form as Sangáy, but much more distant and loftier; this was Cotopaxi, one of the most formidable volcanoes on the face of our globe. Far behind Tunguragua, and peeping over its left shoulder, was distinctly visible a paraboloidal mass of unbroken snow; this was Chimborazo, long considered the monarch of the Andes, and though latterly certain peaks in Bolivia are said to have outtopped it, it will be for ever immortalised in men's memories by its association with such names as Humboldt and La Condamine. Thus to right and left of the view I had an active volcano—Cotopaxi I never saw clearly but once, but Sangáy was often visible when the rest of the Cordillera was veiled in clouds, and on clear nights we could distinctly see it vomiting forth flame every few minutes. The first night I passed at Paca-yacu I was startled by an explosion like that of distant cannon, and not to be mistaken for thunder; it came from Sangáy, and scarcely a day passed afterwards without my hearing the same sound once or oftener.

In the month of July I reached Baños, where I learnt that the snowy points I had observed from Paca-yacu, between Tunguragua and Cotopaxi, were the summits of a group of mountains called Llanganati, from which ran down to the Pastaza the densely-wooded ridges I saw to northward. I was further informed that these mountains abounded in all sorts of metals, and that it was universally believed the Incas had deposited an immense quantity of gold in an artificial lake on the flanks of one of the peaks at the time of the Spanish conquest. They spoke also of one Valverde, a Spaniard, who from being poor had suddenly become very rich, which was attributed to his having married an Indian girl, whose father showed him where the treasure was hidden, and accompanied him on various occasions to bring away portions of it; and that Valverde returned to Spain, and, when on his death-bed, bequeathed the secret of his riches to the king. Many expeditions, public and private, had been made to follow the track indicated by

* El Altar seen from the western side—from Rikamba, for instance—is very distinctly perceived to be a broken-down volcano, which is by no means the case when seen from the east.

† Tunguragua seen from the north and north-west is an almost symmetrical truncated cone, and the most picturesque peak in the Andes.

Valverde, but no one had succeeded in reaching its terminus; and I spoke with two men at Baños who had accompanied such expeditions, and had nearly perished with cold and hunger on the paramos of Llanganati, where they had wandered for thirty days. The whole story seemed so improbable that I paid little attention to it, and I set to work to examine the vegetation of the adjacent volcano Tunguragua, at whose north-eastern foot the village of Baños is situated. In the month of September I visited Cotaló, a small village on a plateau at about two-thirds of the ascent of Guayrapata—the hill in front of Tunguragua and above the confluence of the rivers Patate and Chambo. From Cotaló, on a clear night of full moon, I saw not only Tunguragua, El Altar, Condorasto, and the Cordillera of Cubillío, stretching southwards towards the volcano Sangáy, but also to the eastward the snowy peak of Llanganati. This is one of the few points from which Llanganati can be seen; it appears again, in a favourable state of the atmosphere, a good way up the slopes of Tunguragua and Chimborazo.

At Baños I was told also of a Spanish botanist, who a great many years ago lost his life by an accident near the neighbouring town of Patate, and that several boxes belonging to him and containing dried plants and manuscripts had been left at Baños, where their contents were finally destroyed by insects.

In the summers of the years 1858 and 1859 I visited Quito and various points in the western Cordillera, and for many months the country was so insecure, on account of internal dissensions, that I could not leave Ambato and Riobamba, where my goods were deposited, for more than a few days together. I obtained however indisputable evidence that the "Derrotero," or guide to Llanganati, of Valverde had been sent by the King of Spain to the Corregidores of Tacunga and Ambato, along with a Cedula Real, commanding those functionaries to use every diligence in seeking out the treasure of the Incas. That one expedition had been headed by the Corregidor of Tacunga in person, accompanied by a friar, Padre Longo, of considerable literary reputation. The Derrotero was found to correspond so exactly with the actual localities, that only a person intimately acquainted with them could have drawn it up; and that it could have been fabricated by any other person who had never been out of Spain was an impossibility. This expedition had nearly reached the end of the route, when one evening the Padre Longo disappeared mysteriously, and no traces of him could be discovered, so that whether he had fallen into a ravine near which they were encamped, or into one of the morasses which abound all over that region, is to this day unknown. After searching for the Padre in vain for some days, the expedition returned without having accomplished its object.

The Cedula Real and Derrotero were deposited in the archives of Tacunga, whence they disappeared about twenty years ago. So many people were admitted to copy them that at last some one, not content with a copy, carried off the originals. I have secured a copy of the Derrotero, bearing date August 14th, 1827; but I can meet with no one who recollects the date of the original documents.

I ascertained also that the botanist above alluded to was a Don Atanasio Guzman, who resided some time in the town of Pillaro, whence he headed many expeditions in quest of the gold of Llanganati. He made also a map of the Llanganatis, which was supposed to be still in existence. Guzman and his companions, although they found no deposit of gold, came on the mouths of several silver and copper mines, which had been worked in the time of the Incas, and ascertained the existence of other metals and minerals. They began to work the mines at first with ardour, which soon however cooled down, partly in consequence of intestine quarrels, but chiefly because they became disgusted with that slow mode of acquiring wealth when there was molten gold supposed to be hidden close by; so the mines were at length all abandoned. This is supposed to have taken place early in the present century, but the exact date I can by no means ascertain. Guzman is reported to have met with Humboldt, and to have shown his drawings of plants and animals to that prince of travellers. He died about 1806 or 1808, in the valley of Leytu, about 4 leagues eastward of Ambato, at a small farmhouse called now Leytillo, but marked on his map San Antonio. He was a somnambulist, and having one night walked out of the house while asleep, he fell down a steep place and so perished. This is all I have been able to learn, and I fear no documents now exist which can throw any further light on the story of his life, though a botanical manuscript of his is believed to be still preserved in one of the archives of Quito. I made unceasing inquiries for the map, and at length ascertained that the actual possessor was a gentleman of Ambato, Señor Salvador Ortega, to whom I made application for it, and he had the kindness to have it brought immediately from Quito, where it was deposited, and placed in my hands; I am therefore indebted to that gentleman's kindness for the pleasure of being able to lay the accompanying copy of the map before the Geographical Society.

The original map is formed of eight small sheets of paper of rather unequal size (those of my copy exactly correspond to them) pasted on to a piece of coarse calico, the whole size being 3 ft. 10½ in. by 2 ft. 9 in. It is very neatly painted with a fine pencil in Indian ink—the roads and roofs of houses red, but it has been so roughly used that it is now much dilapidated, and the names,

though originally very distinctly written, are in many cases scarcely decipherable: in making them out I have availed myself of the aid of persons familiar with the localities and with the Quichua language. The attempt to combine a vertical with a horizontal projection of the natural features of the country has produced some distortion and dislocation, and though the actual outline of the mountains is intended to be represented, the heights are much exaggerated, and consequently the declivities too steep. Thus the apical angle of the cone of Cotopaxi (as I have determined it by actual measurement) is 121° , and the slope (inclination of its surface to the horizon) $29\frac{1}{2}^{\circ}$; while on Guzman's map the slope is $69\frac{1}{4}^{\circ}$, so that the actual angle is only three-sevenths of what he has represented it, and we may assume a corresponding correction needed in all the other mountains delineated.*

The whole map is exceedingly minute, and the localities mostly correctly named, but there are some errors of position, both absolute and relative, such that I suppose the map to have been constructed mainly from a simple view of the country, and that no angles and very few compass-bearings have been taken. The margins of the map correspond so nearly with the actual parallels and meridians, that they may be assumed to represent the cardinal points of the compass, as on an ordinary map, without sensible error.

The country represented extends from Cotopaxi on the north to the base of Tunguragua on the south, and from the plain of Callo (at the western foot of Cotopaxi) on the west to the river Puyu, in the forest of Canelos, on the east. It includes an area of something less than an equatorial degree, namely, that comprised between $0^{\circ} 40'$ and $1^{\circ} 33'$ s. lat., and between $0^{\circ} 10'$ w., and near $0^{\circ} 50'$ e. of the meridian of Quito. In this space are represented six active volcanos (besides Cotopaxi), viz. :—

1. El Volcan de los Mulatos, east a little south from Cotopaxi, and nearly on the meridian of the Rio de Ulva, which runs from Tunguragua into the Pastaza. The position of this volcano corresponds to the Quilindaña of most maps—a name which does not occur on Guzman's, nor is it known to any of the actual residents of the country. A group of mountains running to north-east, and terminating in the volcano, is specified as the Cordillera de los Mulatos: it is separated from Cotopaxi by the Valle Vicioso.

2. El Volcan de las Margasitas south-east by east from Los Mulatos, and a little east of north from the mouth of the Rio Verde Grande. "Margasitas" (more properly Marquesitas) corresponds nearly to the term "pyrites," and is a general name for the sulphates of iron, copper, &c.

* The apical angle of Tunguragua—the steepest mountain I ever climbed—is $92\frac{1}{2}^{\circ}$, and the slope $42\frac{1}{2}^{\circ}$.

3. Zunchu-ureu, a smaller volcano than Margasitas, and at a short distance south-south-east of it. "Zunchu" is the Quichua term for mica or tale.

4. Siete-bocas, a large mountain, with seven mouths vomiting flame, south-west by south from Margasitas, west by south from Zunchu. Its southern slope is the Nevado del Atilis.

5. Gran Volcan del Topo, or Yurag-Llanganati, nearly east from Siete-bocas and south-west from Zunchu. A tall snowy peak at the head of the river Topo, and the same as I saw from Cotaló. It is the only one of the group which rises to perpetual snow, though there are many others rarely clear of snow; hence its second name Yurag (White) Llanganati.*

The last four volcanos are all near each other, and form part of what Guzman calls the Cordillera de Yurag-ureu, or Llanganatis of the Topo.

North-east from the Volcan del Topo, and running from south-east to north-west, is the Cordillera de Yana-ureu, or the Llanganatis of the Curaray, consisting chiefly of a wooded mountain with many summits, called Rundu-uma-ureu or Sacha-Llanganati.

6. Jorobado, or the Hunchback, south-south-west half west from Yurag-Llanganati, and between the river Topo and the head of the greater Rio Verde.

I have conversed with people who have visited the Llanganati district as far as forty years back, and all assure me they have never seen any active volcano there; yet this by no means proves that Guzman invented the mouths vomiting flame which appear on his map. The Abbé Velasco, writing in 1770,† says of Tunguragua, "it is doubtful whether this mountain be a volcano or not," and yet three years afterwards it burst forth in one of the most violent eruptions ever known. I gather from the perusal of old documents that it continued to emit smoke and flame occasionally until the year 1780. Many people have assured me that smoke is still seen sometimes to issue from the crater—I was doubtful about the fact, until having passed the night of November 10th, 1857, at a height of about 8000 feet on the northern slope of the mountain, I distinctly saw at daybreak (from 5½ to 6½ A.M.) smoke issuing from the eastern edge of the truncated apex.‡ In ascending on the same side, along the course of the great stream of lava that overwhelmed the farm of Juívi and

* Villavicencio gives its height as 6520 varas (17,878 E. ft.), in his 'Geografía del Ecuador,' from a measurement (as he says) of Guzman, but does not inform us where he obtained his information.

† 'Historia de Quito.'

‡ The same morning (Nov. 11th), at 4 A.M., I observed a great many shooting-stars in succession, all becoming visible at the same point (about 40° from the zenith), proceeding along the arc of a great circle drawn through Orion's Belt and Sirius, and disappearing behind the cone of Tunguragua.

blocked up the Pastasa, below the mouth of the Patate, for eight months, we come successively on six small fumaroli, from which a stream of thin smoke is constantly issuing. People who live on the opposite side of the valley assert that they sometimes see flame hovering over these holes by night. The inhabitants of the existing farm of Juivi complain to me that they have been several times alarmed of late (especially during the months of October and November, 1859) by the mountain "bramando" (roaring) at night. The volcano is plainly therefore only dormant, not extinct, and both Tunguragua and the Llauganatis may any day resume their activity.

Returning to the map, let us trace briefly its hydrography. The actual source of the Napo is considered to be the Rio del Valle, which runs northward through the Valle Vieioso, on the eastern side of Cotopaxi. Its large tributary the Curaray (written Cunaray by Guzman) rises only a few miles more to the south, in the Cordillera de los Mulatos, in several small streams which feed the lake Zapalá (a mile or more across) and issuing from its eastern extremity run east-south-east to Yana-cocha (Black Lake), a large body of water a league and a-half long by two miles broad. After passing this lake the river takes the name of Desaguadero de Yana-cocha, and lower down that of Rio de las Sangurimas, receiving in its course (besides smaller streams) the Rio de los Mulatos from the north, and a good way farther down the Rio de los Llauganatis, coming from the south along a deep ravine (Cañada honda) between Rundu-unu and the Volcan del Topo. Beyond this and nearly north by east from the Volcan del Topo it is joined from the north by a considerable stream, the Curaray Segundo or Rio de las Flechas, and takes the name of Rio Grande de los Curarayes. The general course of the Curaray is eastward, as is also that of the Napo, and although the two rivers diverge so little from each other, they run as it were side by side through four degrees of longitude ere they meet.

The map is traversed from the north-western corner by a large stream, the Patate, rising in the western cordillera near Ilinisa, and running east-south-east through the central *callejon* (the lane between the two cordilleras) to a little south of Cotopaxi, where it reaches the base of the eastern cordillera, which it thenceforth separates from the callejon until it unites with the Chambo, at the foot of Tunguragua, to form the Pastasa. It receives all the streams flowing from the eastern side of the western cordillera, from Ilinisa to Chimborazo, of which the principal is the Ambats. From Cotopaxi the western edge of the eastern cordillera has a general direction of south by east. It consists of elevated paramos sown with lakes and morasses, and rarely covered with snow, which sink down to the river Patate, and from Pillaro southward have

many deep-wooded ravines on the slope. From Pillaro northward they sink down into the plain quite bare of wood. The whole range is vulgarly called "Paramos de Pillaro." The principal tributaries of the Patate entering from these mountains are the Aláquis, which comes in a little north of Tacunya, and whose bed is subject to sudden enlargement from the melting of the snows on Cotopaxi, interrupting all communication with the capital; the Guapanti, whose sources are a number of lakes lying south of Lake Zapalá, their united waters flowing westward through the large lake Pisayambu, and entering the Patate near the village of San Miguel; and the Cusatágua, which comes down through a black wooded valley from the Cerro de los Quinuales; on the left it is joined by a stream which, about midway, forms a high cascade of two leaps, called Chorrera de Chalhaurca (Fish-hill Fall): this cascade is visible from and nearly east of Ambato.

As the great mineral districts of Llanganati, occupying the northern half of the map, was repeatedly travelled over by Guzman himself, it is fuller of minute detail than the rest; and I am assured by those who have visited the actual localities that not one of them is misplaced on the map; but the southern portion is much dislocated; and, as I have traversed the whole of it, I will proceed to make some remarks and corrections on this part of the map. From Chimborazo (lying a few miles to westward of the village of Mocha) a spur or knot is sent off to the eastward, containing the mesetas or paramos of Sanancajas and Sabañán and the heights of Igualata. Guambaló, Múlmúl, and Guayrapata, which last slopes abruptly down to the junction of the Chambo and Patate. These are so much transposed in Guzman's map that I have omitted them in my copy, with the exception of the last. Even the environs of Ambato are much distorted; for the river Pachanlica actually unites with the Ambato a little above the mouth of the latter, instead of running direct into the Patate, some distance below the Ambato, as it is made to appear on the map.

Let us now descend the valley of the Pastasa from Guayrapata.* The easterly wind, due to the earth's rotation, is distinctly felt along the Amazon so long as that river preserves an enormous width, and its course presents no abrupt sinuosities; but in its upper part, and on most of its tributaries, the wind is variable, and owes its modifications partly to local circumstances. In ascending the valley of the Pastasa from the roots of the Andes, one begins to feel the general wind again at a height of about 4000 feet, and, on coming out on the top of Guayrapata (9000 to

* *Guayra-pata* = margin (or beginning) of the wind; thus, *Sacha-pata* = edge of the wood; *Cocha-pata* = margin of the lake.

10,000 feet), the easterly wind (blowing up the gorge of Baños) strikes with tremendous force against that barrier, which is almost continually veiled in mist. The forest which crowns it is so densely hung with mosses as to be almost impenetrable; and one is forcibly struck by the contrast on emerging from the humidity and vigorous vegetation of Guayrapata to the arid sandy plains extending towards Pelileo and Ambato.

The Chambo, which flows at the base of Guayrapata, is a larger stream than the Patate (though Guzman's map represents it much smaller), and takes its origin from the volcano Sangay. The steep descent from Guayrapata to the river is 3000 feet in perpendicular height, and occupies the traveller two hours to descend whether mounted or on foot; but from the opposite margin of the river rises the majestic cone of Tunguragua in an unbroken slope of full 11,000 feet perpendicular! Proceeding eastwards from the confluence of the two rivers, the first stream which enters to swell their united waters is the Lligua coming from the north. Below this, and on the right bank, near the village of Baños, a small stream of tepid water, the Yascún, comes from Tunguragua. Before the last eruption of Tunguragua (April 23rd, 1773) a larger stream came down from the mountain and watered the farm of Juivi, in the angle between the Chambo and Pastasa; but the lava which descended on that side buried the farm, and since then the rivulet has been dry, though its bed is still traceable wherever not covered up by the lava. The water now finds its way through a subterranean channel, and bursts out in considerable volume on the very margin of the Pastasa, beneath the lava which is there heaped up to the height of more than a hundred feet. Not a single stream waters now the northern side of Tunguragua, all the way from Baños to Puela (half a day's journey), though several gush out of the cliff on the right bank of the Chambo.

A little above Baños, and on the same side of the river, stand a few cottages called Pititi (the cleft), because the Pastasa at that point foams through a narrow, tortuous chasm from 150 to 200 feet deep.

Below Baños, and on the opposite (the left) bank, enters the Illúchi, whose course is parallel to that of the Lligua. The next stream, the Río de Ulva, is of considerable volume, and comes down from the snows on the north-eastern side of Tunguragua.

A very little below the mouth of the Ulva, and on the opposite bank enters a still larger stream, the Río Verde Primero, which descends from the paramos of Llanganati.

Thus far there has been little to correct in this part of the map; but the next tributary of the Pastasa therein indicated is now called the Río de Agoyán; and the farm of Agoyán occupies the

site marked on the map "La Yunguilla." There is no river called Yunguilla, and the farm known by that name is actually on the farther side of the next river (the Río Blanco); while the farm of Antombós is at the eastern foot of the hill called El Sapotal, and on a smaller stream than the Río Blanco. Exactly opposite Antombós the river Chinchin falls over a high cliff into the Pastasa.

The last bridge across the Pastasa is above the mouth of the Agoyán: on passing it we have fairly entered the Montaña, or Forest, of Canelos. A little above the mouth of the Río Blanco is the Chorrera de Agoyán, one of the finest waterfalls in South America, where the Pastasa is precipitated over a semicircular cliff, deeply excavated to the left of the fall, a height of about 150 feet.

Continuing along the left bank of the Pastasa, we next reach the Río Verde Segundo—now better known as the Río Verde Grande—which comes from the Cordillera de Pucarumi (Red-stone Ridge), running south of the snowy Llanganati. There is now a fine cane-farm near the mouth of the Río Verde, where the existing track to Canelos passes. The river is unfordable, and has to be crossed at a narrow place by throwing poles across from cliff to cliff.

The prevailing rock in the Gorge of Baños (as this deep, narrow valley may well be called) is mica-schist, though a hard, compact, black, shining, volcanic rock protrudes in many places, especially at the bridges of Baños and Agoyán.

The next river marked on the map is the Río Colorado, now known as the Río Mapóto, but well meriting its ancient name by its red margins and the red stones in its bed, coloured by a ferruginous deposit. At its mouth a broad beach (Playa de Mapoto) extends down the Pastasa for near 2 leagues: this beach is never entirely covered with water even in the highest floods; and it bears great quantities of the wax-tree called "laurél" (*Myrica cerifera*). But the Río Colorado, instead of being at the short distance from the Río Verde represented in the map, is as far apart from it as the Río Verde is from the bridge of Agoyán; and from the Río Verde to Mapoto is a good day's journey, as is also the distance from Mapoto to the river Topo. It is true that the Río Verde and Topo, though so wide apart at the mouth, may converge in the upper part (as is represented in the map); but I much suspect that the eastern portion of the map is much contracted in longitude, although, from the comparative paucity of details, the contrary might seem to be the case.

The Topo is the largest of all the upper tributaries of the Pastasa. In the time of Guzman it seems to have been passed by a Ta-

ravita * a good way up, but the modern track to Canelos crosses it at only 200 yards from the mouth. The Topo, as far as any one has been up it, is one continued rapid; and where it is crossed nothing is to be seen but rocks and foam, while the shock of its waters makes the very ground tremble. To pass over it bridges of bamboo have to be thrown from the margin to rocks in the middle, and thence to the opposite side, so that in all four bridges are needed; but a very slight flood lays one of the rocks under water, and then it is impossible to rest a bridge on it.

Only a league below the mouth of the Topo enters the Shuña, a river of little less volume than the former; but as there is a point on each side, where the rocks advance considerably into the stream, it admits of being passed by a single bridge. A flood, however, renders it equally impassable as the Tópo.

When I journeyed from Canelos to Baños, I found the Shuña somewhat swollen, and crossed it with difficulty; but when I reached the Topo, I found one of the rocks, on which it is customary to rest a bridge, covered with water. My party consisted of sixteen persons, for whose sustenance every article of provision had to be carried along with us. We waited two days: the river, instead of lowering, continued to rise; our provisions were nearly exhausted, and we saw ourselves exposed to perish of hunger. In this dilemma we found a place a little higher up the river, where we determined to attempt the passage by means of three bridges. On making the experiment, we found the distance between the two rocks in the middle so great that the bamboos barely rested with their points against the side of the opposite rock instead of on the top of it; and when a man walked over them they bent with his weight into the water, whose foaming surges threatened to wash him off; and there was obviously no hope of any one passing with the load of one of my boxes. However, a thunder-storm with heavy rain came on, and, seeing no other chance of saving our lives except by risking the passage of the frail bridges, without loss of time I resolved to abandon my goods and get over to the other side. We had barely all crossed in safety when the river rose and carried away our bridges. On the third day afterwards we reached Baños, where I sought out practised cargueros, and sent them off to the Topo; but for fifteen days from the date of my crossing it the waters did not subside sufficiently to allow of bridges being thrown over; and when the cargueros, at the end of that time, succeeded in passing to the opposite side, they found the leather covering of my boxes completely

* *Taravita*, an aerial ferry, consisting of a number of stout thongs stretched across a river from cliff to cliff, and a sort of basket slung on them, wherein a person sits to be drawn over.

soaked and full of maggots! We had left them under ranchos of *Anthurium*-leaves (for the palms have long ago been exhausted between the Topo and the Shuña); and as the rains had been almost unceasing, the leaves had fallen off the roof upon the boxes and were rotting there. Fortunately the contents of the boxes had sustained very little injury.

Many lives have been lost in the Shuña and Topo; and of those who have fallen into the latter only one has come out alive. But the fate is more horrible of those who, shut up between the Shuña and Topo when both are so much swollen as to be impassable, perish of hunger.

The Shuña, though approaching so near the Topo at its outlet, diverges considerably in its upper part; and, as well as I can make out, its source is not far from those of the Ashpa-yacu and Pindu.

When the Topo and Shuña are passed under favourable circumstances, the traveller on his way to Canelos arrives at an early hour the same day at the Cerro Abitagua, a steep mountain ending to the south in perpendicular cliffs, along the very base of which runs the Pastasa; so that the track is made to pass over the summit of Abitagua; and the ascent and descent on the other side occupy a whole day. The great mass of Abitagua seems alluvial; and from this point downwards no more primitive or igneous rock is seen *in situ*, nor indeed all the way down the Amazon until reaching the volcanic districts of Villa Nova and Santarem. Abitagua is also the last hill of any elevation on the eastern side of the Andes (following the valley of the Pastasa): beyond it the ground sinks in gentle undulations down to the great Amazonian plain. From its summit there is a near view of Llanganati, towards the sources of the Topo; but on two occasions that I have ascended Abitagua the summit of Llanganati has been hidden by clouds, and only its wooded flanks and deep, savage valleys have been visible. The valley of the Shuña can be traced to west and north of Abitagua. In descending the eastern slope of the mountain a fine view is obtained of the Great Plain, extending as far as the sight can reach to the south-east like a sea of emerald, in one part of which the Pastasa is seen winding like a silver band, but at so great a distance that it is impossible to discern whether its course be still obstructed by rocks and whirlpools as at the base of Abitagua.

A good day's journey beyond Abitagua brings us to the Ashpa-yacu, which is also sufficiently large to become unfordable after heavy rains: it does not appear at all on Guzman's map. On the following day the Pindu and Púyu are reached; these rivers are equal in size to Ashpa-yacu, and the two unite at a short distance before they reach the Pastasa. In the space between them are a

few huts and chacras of Jívars Indians, the only habitations between the Rio Verde and Canelos.

Beyond the Rio Páyu (River of Mists) the track diverges from the Pastaza, within hearing of whose surges it has run thus far. It also passes the limits of Guzman's map, and continues with an easterly course along the ridges which separate the basin of the Páyu from that of the Bombonasa, which latter river is finally crossed to reach the village of Canelos situated near its left bank.

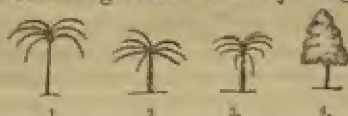
Of the climate of the Forest of Canelos I can only say a few words here. The clouds heaped up against the cordillera by the wind of the earth's rotation descend in daily rains. For three or four months in the year—between November and April—the sun rather predominates over the rain, and this is called "summer;" while for the rest of the year the heavy rains allow the sun to be seen for a very brief interval each day, so they call it "winter," though the climate is in reality a perpetual spring. From the Topo eastward the mist looks as if it were permanently hung up in the trees; and beyond Abitagua wind is scarcely ever felt, except rarely an occasional hurricane; and yet after heavy rains it is customary to find the forest strewed with large green branches. Immense bunches of moss depend from the trees, hiding the very foliage; and when saturated with moisture (which no wind ever shakes out) their weight breaks off the branches whereon they are hung. I am assured by the cargueros that from this cause alone they pass through the forest with fear and trembling after heavy rains; for their load obliges them to travel in a stooping posture, so that they are unable to see the impending danger. Yet with all this moisture the climate is healthy, and I have nowhere suffered so little from going all day in wet clothes.

The track above described is one of the two routes from Ecuador to the Amazon; the other proceeds from Quito to the Indian villages on the Napo, and presents almost equal dangers and difficulties. It is easy to see that the commerce carried on by such routes must be of very slight importance. In another paper I may perhaps discuss the facilities offered and the difficulties to be overcome in the attempt to establish a safe and speedy communication between the Pacific and the Amazon by the various routes which depressions in the Cordillera seem to offer us.

I am unable to give, from personal observation, any account of the geological structure of the country represented in the central and northern portion of the map. The form of the mountains and the rugged peaks leave no doubt that trachyte is the prevailing formation; but some of the rocks seem so regularly columnar that I suppose them to be basaltic; for instance, La Mesa de Ushpa Yuras, La Capilla del Sol and El Docel de Ripalda, all near each other, and a little north of the volcano Margasitas; El Pulpito,

* on the south side of the lakes at the head of the river Guapanti; El Castillojo, north-west of Sieté Bocas, &c.

The parts covered with forest are represented by scattered trees, among which the following forms are easily recognizable:—



No. 1 is the wax-palm (*Palma de Ramos* of the Quitonians—*Ceroxylon andicola* H. et B.*), which I have seen on Tunguragua up to 10,000 feet. Nos. 2 and 3 are tree-ferns (*Helechos*)—the former a *Cyathea*, whose trunk (sometimes 40 feet high) is much used for uprights in houses; the latter an *Alsophila* with a prickly trunk, very frequent in the forest of Canelos about the Rio Verde. No. 4 is the *Aliso* (*Betula acuminata*, Kunth), one of the most abundant trees in the Quitonian Andes; it descends on the beaches of the Pastasa to near 4000 feet, and ascends on the paramos of Tunguragua to 12,000. But there is one tree (represented thus

✚, occupying on the map a considerable range of altitude, which I cannot make out, unless it be a *Podocarpus*, of which I saw a single tree on Mount Abitagua), though a species of the same genus is abundant at the upper limit of the forest in some parts of the western cordillera. A large spreading tree is figured here and there in the forest of Canelos which may be the *Tocte*—a true walnut (*Juglans*), with an edible fruit rather larger than that of the European species. The remaining trees represented, especially those towards the upper limit of the forest, are mostly too much alike to admit of the supposition that any particular species was intended by them.

The abbreviations made use of in the map are—*C*^s for *Cerro* (mountain), *Cord*^s for *Cordillera* (ridge), *Mont*^s for *Montana* (forest), *A*^s for *Arroyo* (rivulet), *L*^s for *Laguna*, and *C*^s for *Cocha* (lake), *Far*^s for *Farallón* (peak or promontory), *H*^s for *Hacienda* (farm), and *C*^s for *Corral* (cattle or sheep-fold).

Mule-tracks (called by the innocent natives "roads") are represented by double red lines, and foot-paths by single lines. I have copied them by dotted lines.

Having now passed in review the principal physical features of the district, let us return to the Derrotero of Valverde, of which the following is a translation. The introductory remark, or title (not in very choice Castilian), is that of the copyist:—

"I have adhered closely to the sense and style of the original. (Guide, or

* I am doubtful if later writers are correct in referring this palm to the genus *Iriarten*.

Route, which Valverde left in Spain, where death overtook him, having gone from the mountains of Llanganati, which he entered many times, and carried off a great quantity of gold; and the king commanded the corregidores of Tacunga and Ambato to search for the treasure: which order and guide are preserved in one of the offices of Tacunga).

"Placed in the town of Pillaro, ask for the farm of Moya, and sleep (the first night) a good distance above it; and ask there for the mountain of Guapa, from whose top, if the day be fine, look to the east, so that thy back be towards the town of Ambato, and from thence thou shalt perceive the three Cerros Llanganati, in the form of a triangle, on whose declivity there is a lake, made by hand, into which the ancients threw the gold they had prepared for the ransom of the Inca when they heard of his death. From the same Cerro Guapa thou mayest see also the forest, and in it a clump of *Sanguirimá* standing out of the said forest, and another clump which they call *Flechas* (arrows), and these clumps are the principal mark for the which thou shalt aim, leaving them a little on the left hand. Go forward from Guapa in the direction and with the signals indicated, and a good way ahead, having passed some cattle-farms, thou shalt come on a wide morass, over which thou must cross, and coming out on the other side thou shalt see on the left-hand a short way off a *juedá* on a hill-side, through which thou must pass. Having got through the *juedá*, thou wilt see two small lakes called "Los Antecojos" (the spectacles), from having between them a point of land like to a nose.

"From this place thou mayest again descry the Cerros Llanganati, the same as thou sawest them from the top of Guapa, and I warn thee to leave the said lakes on the left, and that in front of the point or "nose" there is a plain, which is the sleeping-place. There thou must leave thy horses, for they can go no farther. Following now on foot in the same direction, thou shalt come on a great black lake, the which leave on thy left-hand, and beyond it seek to descend along the hill-side in such a way that thou mayest reach a ravine, down which comes a waterfall: and here thou shalt find a bridge of three poles, or if it do not still exist thou shalt put another in the most convenient place and pass over it. And having gone on a little way in the forest, seek out the hut which served to sleep in or the remains of it. Having passed the night there, go on thy way the following day through the forest in the same direction, till thou reach another deep dry ravine, across which thou must throw a bridge and pass over it slowly and cautiously, for the ravine is very deep; that is if thou succeed not in finding the pass which exists. Go forward and look for the signs of another sleeping-place, which, I assure thee, thou canst not fail to see in the fragments of pottery and other marks, because the Indians are continually passing along there. Go on thy way, and thou shalt see a mountain which is all of *margasitas* (pyrites), the which leave on the left-hand, and I warn thee that thou must go round it in this fashion

☞. On this side thou wilt find a *pajonal* (pasture) in a small plain, which having crossed thou wilt come on a *cañon* between two hills, which is the way of the Inca. From thence as thou goest along thou shalt see the entrance of the *socabón* (tunnel), which is in the form of a church-porch. Having come through the cañon, and gone a good distance beyond, thou wilt perceive a cascade which descends from an offshoot of the Cerro Llanganati, and runs into a quaking-bog on the right hand; and without passing the stream in the said bog there is much gold, so that putting in thy hand what thou shalt gather at the bottom is grains of gold. To ascend the mountain, leave the bog and go along to the right, and pass above the cascade, going round the offshoot of the mountain. And if by chance the mouth of the socabón be closed with certain herbs which they call "salvaje," remove them,

and thou wilt find the entrance. And on the left-hand side of the mountain thou mayest see the 'Guaym' (for thus the ancients called the furnace where they founded metals), which is nailed with golden nails. And to reach the third mountain, if thou canst not pass in front of the socabon, it is the same thing to pass behind it, for the water of the lake falls into it.

"If thou lose thyself in the forest, seek the river, follow it on the right bank; lower down take to the beach, and thou wilt reach the cañon in such sort that, although thou seek to pass it, thou wilt not find where; climb, therefore, the mountain on the right-hand, and in this manner thou canst by no means miss thy way."

With this document and the map before us let us trace the attempts that have been made to reach the gold thrown away by the subjects of Atahualpa as useless when it could no longer be applied to the purpose of ransoming him from the Spaniards.

Pillaro is a somewhat smaller town than Ambato, and stands on higher ground, on the opposite side of the river Patate, at only a few miles' distance, though the journey thither is much lengthened by having to pass the deep quebrada of the Patate, which occupies a full hour. The farm of Moya still exists; and the Cerro de Guapa is clearly visible to east-north-east from where I am writing. The three Llanganatis seen from the top of Guapa are supposed to be the peaks Margasitas, Zunchu, and el Volcan del Topo. The "*Sangurimas*" in the forest are described to me as trees with white foliage; but I cannot make out whether they be a species of *Cecropia* or of some allied genus. The "*Flechas*" are probably the gigantic arrow-cane, *Gynerium saccharoides* (*Arvoré de frecha* of the Brazilians), whose flower-stalk is the usual material for the Indian's arrows.

The morass (Ciénega de Cubillín), the Jucál,* and the lakes called "Anteojos," with the nose of land between them, are all exactly where Valverde places them, as is also the great black lake (Yana-cocha) which we must leave on the left-hand. Beyond the lake we reach the waterfall (Cascada y Golpe de Limpis Pongo), of which the noise is described to me as beyond all proportion to the smallness of the volume of water. Near the waterfall a cross is set up with the remark underneath, "Muerte del Padre Longo"—this being the point from which the expedition first spoken of regressed in consequence of the Padre's sudden disappearance. Beyond this point the climate begins to be warm; and there are parrots in the forest. The deep, dry quebrada

* *Júco* is the name of a tall, solid-stemmed grass, usually about twenty feet high, of which I have never seen the flower, but I take it to be a species of *Gynerium*, differing from *G. saccharoides* in the leaves being uniformly disposed on all sides and throughout the length of the stem, whereas in *G. saccharoides* the stem is leafless below and the leaves are distichous and crowded together (almost equitant) near the apex of the stem. The *Júco* grows exclusively in the temperate and cool region, from 6000 ft. upwards, and is the universal material for laths and rods in the construction of houses in the Quitonian Andes.

(Quebrada honda), which can be passed only at one point—difficult to find, unless by throwing a bridge over it—is exactly where it should be; but beyond the mountain of Margasitas, which is shortly afterwards reached, no one has been able to proceed with certainty. The Derrotero directs it to be left on the left hand; but the explanatory hieroglyph puzzles everybody, as it seems to leave the mountain on the right. Accordingly nearly all who have attempted to follow the Derrotero have gone to the left of Margasitas, and have failed to find any of the remaining marks signalized by Valverde. The concluding direction to those who lose their way in the forest has also been followed; and truly, after going along the right bank of the Curaray for some distance, a stream running between perpendicular cliffs (Cañada honda y Rivera de los Llanganatis) is reached, which no one has been able to cross; but though from this point the mountain to the right has been climbed, no better success has attended the adventurers.

"Socabon" is the name given in the Andes to any tunnel, natural or artificial, and also to the mouth of a mine. Perhaps the latter is meant by Valverde, though he does not direct us to enter it. The "Salvaje" which might have grown over and concealed the entrance of the Socabon, is *Tillandsia usneoides*, which frequently covers trees and rocks with a beard 30 or 40 feet long.

Comparing the map with the Derrotero, I should conclude the cañon, "which is the Way of the Inca," to be the upper part of the Rivera de los Llanganatis. This cañon can hardly be artificial, like the hollow way I have seen running down through the hills and woods on the western side of the Cordillera, from the great road of Asuay, nearly to the river Yaguachi. "Guayra," said by Valverde to be the ancient name for a smelting-furnace, is now-a-days applied only to the wind. The concluding clause of this sentence, "que son tachoneados de oro," is considered by all competent persons to be a mistake for "que es tachoneado de oro."

If Margasitas be considered the first mountain of the three to which Valverde refers, then the Tembladál or Bog, out of which Valverde extracted his wealth, the Socabon and the Guyra are in the second mountain, and the lake wherein the ancients threw their gold in the third.

Difference of opinion among the gold-searchers as to the route to be pursued from Margasitas would appear also to have produced quarrels, for we find a steep hill east of that mountain, and separated from it by Mosquito Narrows (Chushpi Pongo), called by Guzman "El Peñon de las Discordias."

If we retrace our steps from Margasitas till we reach the eastern margin of Yana-cocha, we find another track branching off to northward, crossing the river Zapalá at a point marked Salto de

Cobos, and then following the northern shore of the lake. Then follow two steep ascents, called respectively "La Escalera" and "La Subida de Ripalda," and the track ends suddenly at the river coming from the Inca's Fountain (La Pila del Inca), with the remark "Sublevacion de los Indios—Salto de Guzman," giving us to understand that the exploring party had barely crossed the river when the Indians rose against them, and that Guzman himself repassed the river at a bound. These were probably Indians taken from the towns to carry loads and work the mines; they can hardly have been of the nation of the Curarayes, who inhabited the river somewhat lower down.

A little north and east of the Anteojos there is another route running a little farther northward and passing through the great morass of Illubamba, at the base of Los Mulatos, where we find marked El Atolladero (the Bog) de Guzman, probably because he had slipped up to the neck in it. Beyond this the track continues north-east, and after passing the same stream, as in the former route, but never to its source in the Incas fountain, there is a tambo called San Nicolas, and a cross erected near it marks the place where one of the miners met his death (Muerte de Romero). Another larger cross (La Cruz de Romero) is erected farther on at the top of a basaltic mountain, called El Sotillo. At this point the track enters the Cordillera de las Margasitas, and on reaching a little to the east of the meridian of Zunchu-ureu, there is a tambo with a chapel, to which is appended the remark, "Destacamento de Ripalda y retirada per Orden Superior." Beyond the fact thus indicated, that one Ripalda had been stationed there in command of a detachment of troops, and had afterwards retired at the order of his superiors, I can give no information.

There are many mines about this station, especially those of Romero just to the north, those of Viteri to the east, and several mines of copper and silver which are not assigned to any particular owner. Not far to the east of the Destacamento is another tambo, with a cross, where I find written, "Discordia y Consonancia con Guzman," showing that at this place Guzman's fellow-miners quarreled with him, and were afterwards reconciled. East-north-east from this, and at the same distance from it as the Destacamento, is the last tambo on this route, called El Sumadal, on the banks of a lake, near the Rio de las Flechas. Beyond that river, and north of the Curaray, are the river and forests of Gancaya.

Another track running more to the north than any of the foregoing, sets out from the village of San Miguel, and passes between Cotopaxi and Los Mulatos. Several tambos, or huts for resting in, are marked on the route, which ends abruptly near the Minas de Pinel (north-east from Los Mulatos), with the following remark

by the author—"Conspiracion contra Conrado y su acelerado regreso," so that Conrado ran away to escape from a conspiracy formed against him, but who he was, or who were his treacherous companions, it would now perhaps be impossible to ascertain.

Along these tracks travelled those who searched for mines of silver and other metals, and also for the gold thrown away by the subjects of the Inca. That the last was their principal object, is rendered obvious by the carefulness with which every lake has been sounded, that was at all likely to contain the supposed deposit.*

The mines of Llanganati, after having been neglected for half a century, are now being sought out again with the intention of working them; but there is no single person at the present day able to employ the labour and capital required for successfully working a silver mine, and mutual confidence is at so low an ebb in this country that companies never hold together long. Besides this, the gold of the Incas never ceases to haunt people's memories; and at this moment I am informed that a party of explorers who started from Tacunga imagine they have found the identical Green Lake of Llanganati, and are preparing to drain it dry. If we admit the truth of the tradition that the ancients smelted gold in Llanganati, it is equally certain that they extracted the precious metal in the immediate neighbourhood; and if the Socabon of Valverde cannot at this day be discovered, it is known to every one that gold exists at a short distance, and possibly in considerable quantity, if the Ecuatoreans would only take the trouble to search for it, and not leave that task to the wild Indians, who are content if, by scooping up the gravel with their hands, they can get together enough gold to fill the quill which the white man has given them as the measure of the value of the axes and lance-heads he has supplied to them on trust.

The gold region of Canelos begins on the extreme east of the map of Guzman, in streams rising in the roots of Llanganati and flowing to the Pastasa and Curaray,† the principal of which are the Bombonasa and Villano. These rivers, and their smaller tributaries, have the upper part of their course in deep ravines, furrowed in soft alluvial sandstone-rock, wherein blocks and pebbles of quartz are interspersed, or interposed in distinct layers. Towards their source they are obstructed by large masses of quartz and other rocks; but as we descend the stones grow fewer, smaller, and more rounded, until towards the mouth of the Bombonasa, and thence throughout the Pastasa, not a single stone of the smallest size is to be found. The beaches of the Pastasa consist almost entirely of

* The name Curaray itself may be derived from "curi," gold.

† The soundings of the lakes are in Spanish varas, each near 33 English inches,

powdered pumice brought down from the volcano Sangay by the river Palora. When I ascended the Bombonasa, in the company of two Spaniards, who had had some experience in mining, we washed for gold in the mouth of most of the rivulets that had a gravelly bottom, as also on some beaches of the river itself, and never failed to extract a few fragments of that metal. All these streams are liable to sudden and violent floods. I once saw the Bombonasa at Paca-yacu, where it is not more than 40 yards wide, rise 18 feet in 6 hours. Every such flood brings down large masses of loose cliff, and when it subsides (which it generally does in a few hours) the Indians find a considerable quantity of gold deposited in the bed of the stream.

The gold of Canelos consists almost solely of small particles (called "chispas"—sparks), but as the Indians never dig down to the base of the wet gravel, through which the larger fragments of gold necessarily percolate by their weight, it is not to be wondered at that they rarely encounter any such. Two attempts have been made, by parties of Frenchmen, to work the gold-washings of Canelos systematically. One of them failed in consequence of a quarrel which broke out among the miners themselves, and resulted in the death of one of them. In the other, the river (the Lliquino) rose suddenly on them by night and carried off their canoes (in which a quantity of roughly-washed gold was heaped up), besides the Long Tom and all their other implements.

I close this memoir by an explanation of the Quichua terms which occur most frequently on the map.

Spanish authors use the vowels *u* and *o* almost indiscriminately in writing Quichua names, although the latter sound does not exist in that language; and in some words which have become grafted on the Spanish, as spoken in Peru and Ecuador, the *o* has supplanted the *u* not only in the orthography but in the actual pronunciation, as, for instance, in Pongo and Cocha, although the Indians still say "Chimbu-rasu," and not "Chimborazo"—"Cutu-pacsi," or "Cutu-pagsi," and not "Cotopaxi." The sound of the English *u* is indicated in Spanish by *gu* or *hu*; that of the French *j* does not exist in Spanish, and is represented by *ll*, whose sound is somewhat similar; thus "Lligua" is pronounced "Jiwa." "Llanganati" is now pronounced with the Spanish sound of the *ll*, but whether this be the original mode is doubtful. An unaccented terminal *e* (as in Spanish *verde*) is exceedingly rare in Indian languages, and has mostly been incorrectly used for a short *i*; thus, if we wish to represent the exact pronunciation, we should write "Casiquiari," "Ucáyali," and "Llanganati"—not Casiquiare, Ucayale, Llanganate.

"Llanganati" may come from "llánga," to touch, because the group of mountains called by that name touches on the sources of

the rivers all round; thus, on Guzman's map, we find "Llanganatis del Rio Verde"—"Llanganatis del Topo"—"Llanganatis del Curaray," for those sections of the group which respectively touch on the Rio Verde, the Topo, and the Curaray. The following are examples of the mode of using the verb "llanga." "Ama llangüichu!"—"Touch it not!" "Imapág llancángui?"—"Why do you touch it;" or "Pitag llancaynirca?"—"Who told you to touch it?" And the answer might be "Llancanatág chári-cárea llancarcáni."—"[Thinking] it might be touched, I touched it."

It is to be noted that the frequent use of the letter *g*, in place of *c*, is a provincialism of the Quitonian Andes, where (for instance) they mostly say "Inga" instead of "Inca." But in Maynas the *c* is used almost to the exclusion of the *g*; thus "yúrag," white, and "pitag," who, are pronounced respectively "yurac" and "pitac" in Maynas.

"Tungurágua" seems to come from "tungúri," the ankle-joint, which is a prominence certainly, though scarcely more like the right-angled cone of Tunguragua, than the obtuse-angled cone of Cotopaxi is like a wen ("coto" or "cutu").

Of the termination "agua" (pron. "awa") I can give no explanation.

"Cungúri," in Quichua, is the knee; thus an Indian would say "Tungúri-mánta cungúli-cáma llustirishcáni armáshpa," *i. e.*, "In falling ('urmashpa') I have scrubbed off the skin from the ankle to the knee."

Among rustics of mixed race, whose language partakes almost as much of Quichua as of Spanish, it is common to hear such expressions as "De tunguri á cunguri es una cola llaga."—"From the ankle to the knee is a continuous sore."

The following words occur repeatedly on the map:—

"Ashpa" (in Maynas "Allpa"), earth. "Urcu," mountain.

"Rumi," stone. "Cócha (cucha)," lake.

"Yácu," river. "Ucsa," grass, or grassy-place ("Pujónál" Sp.). "Póngo (punga)," door or narrow entrance.

"Cáchu," corner. "U'ma," head. "Paccha," cataract.

"Cúri," gold. "Cúlqui," silver. "Alquímia," copper.

"Ushpa," ashes.

"Chíri," cold. "Yúnga," warm, from which the Spaniards have formed the diminutive "Yungúlla," warmish, applied to many sites where the sugar-cane begins to flourish.

"Yúrag," white. "Yána," black. "Púca," red. "Quílla," yellow.

"I'shcai," two; ex. "I'shcai-guáuqui," the Two Brothers; a cloven peak to the east of Los Mulatos. "Chunga," ten; ex. "Chunga-uma," a peak with ten points, a little to south of "Ishcai-

guauqui." "Parca," double; thus a hill which seems made up of two hills united, is called "Parca-arcu."

"Angas," a hawk. "Ambátu," a kind of toad.

"Sicha," forest. "Cáspi," tree. "Yúras," herb. "Quínua," the "Chenopodium Quinoa," cultivated for its edible seed. "Pujín," hawthorn (various species of *Crataegus*); thus "Moñtana de Pujines," Hawthorn Forest; "Cerro Pujín el chico," Little Hawthorn-hill. "Cubillín," a sort of Lupine, found only on the highest paramos. It gives its name to a long ridge of the eastern Cordillera, mostly covered with snow, extending from Condorasto and El Altar towards Sangay. "Totorra," a large bulrush from which mats are made; hence "Totorrál," a marsh full of bulrushes. "Sara," maize.

"Tópo" is the name given in Maynas to the Raft-wood trees, species of *Ochroma* (of the N. O. *Bombaceæ*). They begin to be found as soon as we reach a hot climate, say from 3000 feet elevation downwards.

"Rundu," sleet; thus "Rundu-uma," Sleetly Head. "Rásu" is snow, and occurs in "Chimbu-rasu, Caraguai-rasu" (Carguairago), and many other names. The vulgar name for snow as it falls is "Papa-cara," i. e. potato peelings.

"Pucará" indicates the site of a hill-fort of the Incas, of which a great many are scattered through the Quitonian Andes.

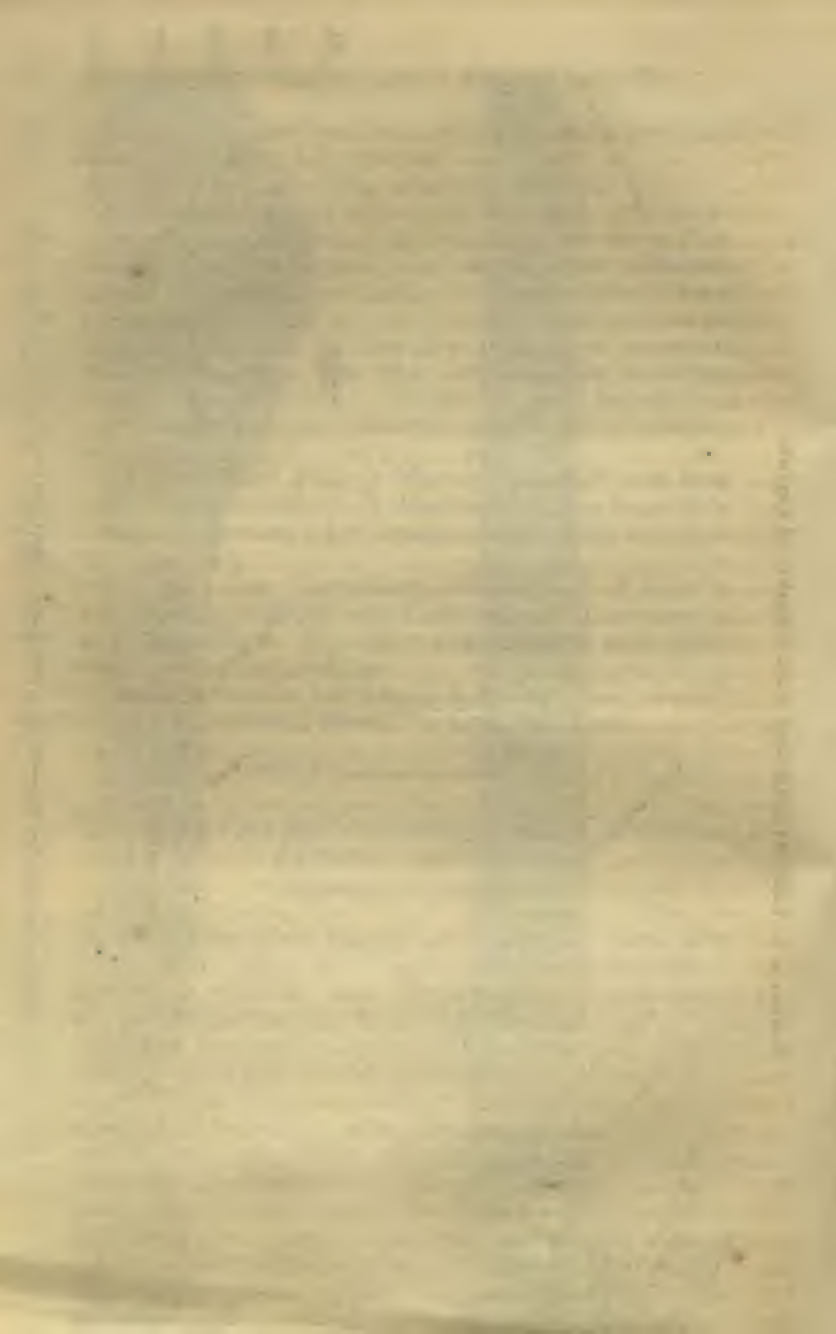
XII.—*Journey from Quito to Cayambe.* By DR. WILLIAM JAMESON. 1859.

Read, March 12, 1860.

A WEEK'S relaxation from my duties at the University of Quito gave me an opportunity of making an excursion to Cayambe, a snowy mountain of imposing aspect, situated E.N.E. of Quito, and, according to Humboldt, directly under the Equator.

Before setting out I shall offer a few observations on the city of Quito, where I have resided for so many years.

Quito is built on what may be called a ledge of the volcanic mountain of Pechincha, at an elevation of 9528 feet above the level of the sea. The mountain rises in the background to a height of 15,976 feet, and is crowned by a wall of trachytic rocks surrounding the crater, the depth of which is 2460 feet; and consequently the bottom, where a volcanic agency is in active operation, is nearly 4000 feet above the level of the city. Snow frequently falls on the sandy desert of the crater; but two or three days of fine weather cause its disappearance, excepting in some



localities where it lies in patches, sheltered from the rays of a vertical sun. The summit of Pechincha barely enters the snow-limit, for which reason the congealed water does not assume the compact and crystalline form observed in what is strictly called a glacier. The snow brought down to the city for the preparation of ice-cream has the appearance of a conglomerate of hailstones. On the eastern chain there are several very lofty summits, capped with immense masses of solid ice, reflecting the rays of the setting sun, and presenting to the eye various beautiful prismatic tints, which, so soon as the solar light is withdrawn, assume a pure white colour.

The climate is agreeable and salubrious, the mean temperature being about 57° . The thermometer never rises above 64° , nor sinks below 46° . The average range within the twenty-four hours may be stated at about 10° . These observations of course apply to Quito and the neighbouring plains. A journey of four hours will place the traveller in the region of eternal frost, or, in the space of half a day he can descend the deep and sultry valleys that separate the mighty chains of the Andes; or, finally, he may visit the tropical forest extending to the shores of the Pacific. This variation of temperature, dependent on elevation, and occurring within narrow limits, furnishes a daily and diversified supply of vegetable food: from the plantain, which, as a substitute for bread, is largely consumed by the inhabitants of the coast, to the wheat, potato, and other grains and roots, growing luxuriantly on the cool table-lands of the interior. Besides these, the market is furnished with pine-apples, chirimoyas (*Anona chirimoya*), guayavas (*Psidium pomiferum*), guavas (*Inga pachycarpa*), the fruits of different species of passion-flower, oranges, and lemons; and, from January to April, certain European fruits, such as apples, pears, quinces, peaches, apricots, and strawberries, the last-mentioned fruit having been probably introduced from Chile.

The population of Quito does not exceed 40,000. On several occasions the Government has been desirous of ascertaining the actual number of inhabitants, but without arriving at a satisfactory result. The people became alarmed, from an idea that the formation of a census is a preliminary step towards the imposition of a tax, and the information thus obtained was necessarily defective.

The summit of Pechincha can at no time be seen from the town or its immediate vicinity. Viewed a little from the eastward, the flank of the mountain presents four successive zones. The lower portion, extending from the base to an elevation of 10,500 feet, has a climate still available for the production of wheat, barley, and "quinoa" (*Chenopodium*), potatoes, and other roots, of South American origin (*Oxalis*, *Basella*, and *Tropaeolum*), and a few other hardy vegetables. Next in succession is a belt of shrubs,

forming the line of division between the lower region just described and that to be presently mentioned. In some districts the shrubs constitute a varied and interesting flora. Beyond them commences the "paramo," or pasture-ground of the Andes, between the limits of 12,000 and 14,500 feet of elevation; a region of great horizontal extent, thickly clothed with hard wiry-leaved grasses, of a hue intermediate between green and yellow, and capable of sustaining countless herds of cattle. At 15,000 feet vegetation becomes less vigorous. The grass, instead of covering the entire surface, is distributed in patches or tufts, intermingled with a few hardy shrubs of valerian, *Chuguiraga*, and *Baccharis*, all of which grow and flourish on the sandy desert of the crater. A singular lupine, bearing a floral spike like a fox's tail (*Lupinus alopecuroides*), is characteristic of this region; also an umbelliferous plant (*Petroselinum dissectum*, Benth.), which, by proper management, might yield good celery. In other situations the volcanic débris, rolled down from the summit, displays patches of more humble growth, adorned, however, with large and bright blossoms, yellow, blue, purple, and violet. Of the latter description are those of *Sida Pichinchensis*, which, from their natural association with snow and sleet, recall to memory some of those charming plants we so much admire in our gardens as the harbingers of spring.

The people are generally kind and courteous to strangers, and rarely infringe the rights of hospitality. They are, moreover, endowed with a good natural capacity, but lack the energy and perseverance to accomplish an important undertaking. I regret to say that, for the last thirty years, there has been no social or financial improvement in the condition of the country. In proof of this assertion, I aver that no road to the coast has yet been opened, and that the only one (described by Ulloa in a work published at an early period of the last century) has undergone no manner of repair. Its southern termination is nearly concealed by a rank tropical vegetation, or obstructed by fallen trees undergoing different stages of decay. There is for one-half of the year an almost total suspension of commerce between Guayaquil and the interior. Should any article in the shape of a box or bale arrive at the port during the rainy season, the owner, who may be in Quito, must wait for it perhaps six or eight months, or till the road becomes *naturally* passable.

Education has never been patronized by the Government or members of Congress, who yearly assemble in the capital; for which reason the system at present pursued must be considered objectionable, inasmuch as attention is principally devoted to the study of law, medicine, and theology, to the neglect of practical science.

The salaries of the professors amount to 3950 dollars, and the

rents of the University amount annually to the sum of from 4000 to 4500 dollars. No fees are paid by the students to the professors.

I shall now proceed on my journey. For about 15 miles beyond the suburbs, in a north-easterly direction, the country is nearly level, and clothed with an ever-verdant growth of native grass, dotted with trees of wild cherry and myrtle. The former (*Prunus salicifolia*) seems to thrive best on a light dry soil. Around the villages of Tacunga, Ambato, and Riobamba, built on a sandy plain, and situated respectively at 50, 70, and 100 miles to the south of Quito, the plantation of the wild cherry or "Capuli" is considered a matter of importance, because its wide-spreading roots, extending beneath the barren surface, bind down or restrain the encroachment of sand under which the crops might be buried.

Pursuing the same direction we arrive at the brow of a steep hill, forming the western flank of the valley of the Guallabamba, and descending a lengthened path, in many places winding and precipitous, we reach the bottom of the valley, and cross the river by a bridge constructed of stone. The river Guallabamba has its origin at the head of the valley of Chillo, and becomes augmented by several streams, flowing principally from the eastern Cordillera. It finally unites its waters with those of the Esmeraldas in its course to the Pacific.

The descent from the table-land to the bottom of the valley, measuring perpendicularly nearly 3000 feet, can hardly be achieved in less than two hours, during which the traveller is incommoded by the sun's heat reflected from the bare rock, to avoid which he prefers, if possible, starting with the early dawn. The bridge of Guallabamba is 6300 feet above the level of the sea.

The flora has now assumed a distinct character. Instead of *Ranunculi* and *Calceolaria*, whose yellow blossoms enliven the fertile meadows to the south of Quito, we behold a parched rocky soil, producing Euphorbiaceæ (*Euphorbia*, *Croton*), Bromeliaceæ *Agave Pourretia*, *Pitcairnia*, *Tillandsia*), various species of Cactus, and lastly, a *Mimosa*, with *Tillandsia usneoides*, hanging in profusion from its branches.

The village of Guallabamba is situated about a mile farther to the eastward, 646 feet above the bed of the river. The houses are low, having merely a ground-floor with wattled walls: that is to say, they are constructed of a species of wild cane interwoven with twigs. The only stone edifice was the church, now a shapeless heap of ruins since its overthrow by the earthquake of last year.

Guallabamba, from its temperate climate, produces various semi-tropical fruits, as the chirimoya and lemon; but the staple article is the sugar-cane, which here requires a period of eighteen months

to arrive at a state of maturity. The proximity of a plot of marshy ground renders the locality unhealthy, and severe agues are prevalent. A single night's sojourn in the village will frequently communicate the germ of this malady, which may, after several days, be developed in another situation far removed from its influence.

On the 22nd of December I left Guallabamba, an hour before sunrise. The road to the eastward of the village is traced over hills of sand, or rather an agglutinated volcanic earth or scoria, on which grow little trees of *Mimosa*, with globular golden flowers. An arborescent *Acacia* is also common, the pods of which, from their powerful astringency, are applied to the same uses as the gall-nuts of Europe.

At daybreak we crossed the Pisgui by a stone bridge. This stream has its origin in Cayambe, and at this point flows over huge masses of basalt, a rock forming the banks of the river, and elevated nearly 1500 feet above its channel. A narrow path ascends from the opposite side, apparently cut with much labour through the basaltic rock, and paved with the same material.

After a tiresome ascent, which occupied us for nearly two hours, we at length reached the table-land, extending to the base of the eastern Andes. The air was cool and refreshing, and the sky clear and cloudless. Directly in front of us rose majestically the mighty dome of Cayambe,* with its dazzling surface of snow, through which bristled some naked rocks, whose position might be 2000 or 3000 feet above the usual snow-limit.

At noon we passed through the village of Tabacundo, a prolonged line of houses occupying both sides of the high road. It has about 2000 inhabitants, and the houses are constructed of sun-baked bricks, or "odoves," with tiled roofs.

The village of Cayambe is situated three or four miles further to the eastward, on a gentle declivity, forming the base of the mountain bearing the same name. Its elevation is 9724 feet, or nearly 200 feet higher than Quito. Its flora is in every respect similar. The soil is remarkably fertile, and well watered by numerous streams flowing from the snowy region in the background. This abundance of water enables the land-proprietor to establish a system of irrigation, imparting a remarkable freshness and beauty to the surrounding landscape.

I am acquainted with no other mountain district where cattle are so numerous. The number of these animals distributed over the different farms cannot be less than 30,000, and their respective owners derive a liberal emolument from the produce of the dairy,

* Mount Cayambe, in lat. 6° 0', elevated 19,396 feet above the level of the sea. Photograph taken 26th December, 1859.

particularly cheese, an article consumed in this country to an enormous amount.

The following are the prices of some of the agricultural productions of Cayambe:—Cattle are worth from 20 to 25 dollars a head; a sheep from 2 to 5 reals; a quantity of wheat, weighing 16 arrobas (16 pounds), is worth 12 dollars; barley, 4 reals the arroba; potatoes, 6 reals the sack. Beef is sold at 6 reals the arroba. A fowl costs from 1 to 1½ real.

December 23rd.—Close on Christmas, and therefore to persuade any one to accompany me to the snowy region was utterly impossible. I had to wait three days, and on the 26th set out, attended by an Indian guide. Our ascent by the northern side, though an easy one, occupied us about six hours. Towards the afternoon we had reached an elevation of 14,000 feet, when my guide pointed out to me a forest, which, on close examination, I found to consist of trees of two species of *Polylepis*. In the midst of it we found a hut well covered with straw, and abundance of material for fuel. Early on the day following I ascended to the snow-limit, and, botany being my principal object, registered all the plants I observed. I cannot say there is any material difference between the flora of Cayambe and that of Pechincha. The accompanying list contains the species I met with on this occasion, and also a rough sketch representing a section of the valley of Guallabamba between Pechincha and Cayambe.

Quito, 25 Jan., 1860.

Plants collected on Cayambe, Dec. 27, 1859.

- Ranunculaceæ.*—*Ranunculus* Gusmanni, H. B. K., snow limit; *R. Peruvianus*, D. C., "Paramos," at 13,000 feet; *R. Bonplandianus*, Kth., 10,000 to 13,000 feet.
Cruciferae.—*Turritis hispidula*, D. C., at 13,000 feet; *Draba alyssoides*, D. C., snow limit; *D. obovata*, Benth., snow limit.
Polygalaceæ.—*Monina crassifolia* (Hebeandra crassifolia, Bonpl.), at 13,000 feet.
Caryophyllaceæ.—*Cerastium imbricatum*, H. B. K., snow limit; *C. floccosum*, Benth., snow limit.
Hypericaceæ.—*Hypericum laricifolium*, Pers. Syn., 11,500 to 13,000.
Geraniaceæ.—*Geranium acaule*, H. B. K., at 13,000 feet; *G. sibbaldioides*, Benth., snow limit.
Leguminosæ.—*Lathyrus gladiatus*, Hooker, 12,000 to 13,000 feet; *Lupinus humifusus*, Benth., 13,000 feet; *L. nubigenus*, H. N. K., 13,000 feet; *L. alopecuroides*, Desr., snow limit.
Rosaceæ.—*Rubus glabratus*, H. B. K., var., fol. solitariis, basi subcoarctatis, 13,000 feet.
Sanguisorbaceæ.—*Alchemilla nivalis*, H. B. K., snow limit; *Polylepis incana*, H. B. K., 13,000 to 14,000 feet; fol. impari-pinnatis, racemo florifero prolongato, 13,000 feet; *Margyriacarpus tetosus*, B. N. P., 10,000 feet.
Onagraceæ.—*Epilobium Bonplandianum*, H. B. K., 13,000 feet.
Grossulariaceæ.—*Ribes frigidum*, H. B. K., 14,000 feet.
Saxifragaceæ.—*Saxifraga Andicola*, H. B. K., 14,000 feet.
Umbellifera.—*Azorella aretoides*, Willd., 13,000 feet; *A. pedunculata*, Willd., 14,000 feet; *Petroselinum dissectum*, Benth., 14,000 feet; *Eryngium humile*, var. subacaule, Cav. Ic., 11,000 to 12,000 feet.

Valerianaceae.—*Valeriana Bonplandiana*, Wedd., at the snow limit; *V. microphylla*, H. B. K., 12,000 to 13,000 feet; *V. plantaginea*, H. B. K., snow limit.

Compositae.—*Chuquiraga insignis*, H. B. K., 14,000 feet; *Calcitium reflexum*, H. B. K., 14,000 feet; *C. nivale*, H. B. K., snow limit; *C. rufescens*, H. B. K., snow limit; *Andromachia acaulis*, H. B. K., 14,000 feet; *Werneria graminifolia*, H. B. K., snow limit; *W. disticha*, H. B. K., snow limit; *W. nubigena*, H. B. K., 13,000 feet; *Aster rupestris*, H. B. K., snow limit; *Homothitis multiflorus*, H. B. K., 12,000 feet; *Senecio nubigenus*, H. B. K., 12,000 to 13,000 feet; *S. Baccharoides*, H. B. K., 13,000 feet; *Aphanactes Jamesoni*, Wedd., 13,000 feet; *Baccharis thyoides*, Pers. Syn., 14,000 feet; *B. genistelloides*, Pers. Syn., 12,000 feet; *B. ferruginea*, Pers. Syn., snow limit; *Conyza pusilla*, H. B. K., 13,000 to 14,000 feet.

Ericaceae.—*Vaccinium empetrifolium*, H. B. K., 14,000 feet; *Gaultheria myrsinoides*, H. B. K., 13,000 to 14,000 feet.

Escalloniaceae.—*Escallonia myrtelloides*, H. B. K., 13,000 feet.

Gentianaceae.—*Gentiana diffusa*, H. B. K., 11,000 to 13,000 feet; *G. sedifolia*, H. B. K., 13,000 feet to the snow limit; *G. rupicola*, H. B. K., snow limit; *Halenia asclepiadea*, Benth., 13,000 to 14,000 feet.

Labiata.—*Thymus nubigenus*, H. B. K., 13,000 feet.

Scrophulariaceae.—*Calceolaria lavandulifolia*, H. B. K., 12,000 feet; *C. floribunda*, H. B. K., 13,000 feet; *Veronica serpyllifolia* (?) Linn., 14,000 feet; *Castilleja nubigena*, H. B. K., 11,000 to 14,000 feet.

Plantaginaceae.—*Plantago rigida*, H. B. K., snow limit.

Orchidaceae.—*Altensteinia paleacea*, H. B. K., 13,000 feet; *Myrosmodes nubigenum*, Reich., snow limit.

Iridaceae.—*Sisyrinchium Bogotense*? H. B. K., 12,000 feet.

Amaryllidaceae.—*Stenomesson aurantiacum*, Herb., 11,000 feet; *Phedranassa obtusa*, Herb., 10,000 feet; *Bonarea Caldasiana*, Herb., 10,000 to 13,000 feet; *Collania glaucescens*, Herb., snow limit.

Juncaceae.—*Juncus andicola*, Hook., 13,000 feet; *Luzula alopecurus*, Desr., snow limit.

Cyperaceae.—*Carex Pichinchensis*, H. B. K., 13,000 to 14,000 feet.

Gramineae.—*Arundo nitida*, H. B. K., 10,000 to 13,000 feet; *Pectaea dasyantha*, H. B. K., snow limit; *Poa muliensis*, H. B. K., snow limit.

Filices.—*Polypodium subcrenatum*, Hooker, 12,000 feet; *Jamesonia imbricata*, Hooker, 13,000 feet; *J. cinnamomea*, Kze., snow limit.

Lycopodiaceae.—*Lycopodium Pichinchense*, Hooker, 13,000 feet; *L. crassum*, Willd., 13,000 feet to the snow limit.

XIII.—The Province of Caravaya, in Southern Peru. By CLEMENTS R. MARKHAM, F.R.G.S.

Read, June 10, 1861.

IN 1854 I communicated a paper to the Geographical Society, on the Sources of the River Purus, one of the principal tributaries of the Amazons.* This year I have been employed by her Majesty's Government on a special service, which made it my duty to explore some other portions of the region whose streams contribute to feed the Purus, in Southern Peru, and I now propose to transmit some of the results of my observations.

The Purus is the only great affluent, flowing into the Amazons from the south, whose course has never yet been explored. We

* See Journal of the Royal Geographical Society, vol. xiv. p. 151, 1855.

Sketch Map
of the
PROVINCE OF CARAVAYA, &c
in Southern Peru,
showing the Sources of the
River Purus.

By Clements R. Markham Esq.

Mr Markham's route in 1855 and 1861
Modern Gold-diggings

Scale in Miles
0 10 20 30 40





have detailed accounts of the Huallaga from Maw, Smyth, Poëppig, and Herndon; of the Ucayali from Smyth, Herndon, and Castelnau; of the Madeira from Castelnau and Gibbon; but of the Purus, the largest apparently, and one which, in course of time, will probably become the most important, we have next to nothing. Its mouth, and the course of its tributaries, near the base of the Andes, are alone described as yet.

Condamine and Smyth,* in descending the Amazons, mention the great depth and volume of water at the mouth of the Purus: Herndon heard from a Brazilian trader at Barra, who had ascended its stream for some distance, that it was of great size and without obstructions; and Haënke, in the last century,† arguing from reliable geographical data which he had collected from Indians, stated his conviction that a very large river, flowing from the Andes, east of Cuzco, reached the Amazons, to the westward of the mouth of the Madeira.

This is the sum of our knowledge of the mouth and the lower course of the Purus. The tributaries which flow into it drain the eastern slopes of the Andes, from the latitude of Cuzco quite to the frontier of Bolivia; that frontier dividing the streams flowing into the Purus, on the Peruvian side, from those which feed the Beni, on the Bolivian. These affluents of the Purus are divided into three distinct systems:—I. That furthest to the north and west, consisting of the streams flowing through the great valley of Paucartambo, which unite under the name of the *Madre de Dios*, or *Amaru-mayu*; II. The middle system draining the ravines of *Marcapata*; and III. The southern and eastern, being the numerous rivers in the province of Carabaya, as far as the Bolivian frontier, which unite as the river *Ynambari*. The *Madre de Dios* and *Ynambari* together probably form the main stream of the Purus.

I. The *Paucartambo* system is the only one which has, as yet, been described by modern explorers. I have given some account of its original discovery by the Spanish Conquerors, in my introduction to 'The Valley of the Amazons,' printed by the Hakluyt Society. In Spanish times these streams were explored, and farms of cacao and coca were established on their banks; and in the last century an expedition was sent to explore the *Madre de Dios*, under an officer named Landa. This must have been at some time previous to 1783, as Landa was killed in that year, in the great rebellion of the Indians. The journal of his expedition is preserved amongst the archives of the municipality of Cuzco, and

* Royal Geographical Society's Journal, vols. vi. pp. 11, 174; xxv. p. 157.

† Ibid., vol. v. p. 90.

I have taken steps to procure a copy of it. After the declaration of Peruvian independence General Gamarra, the first Republican Prefect of Cuzco, sent an expedition to protect the farms in the valley of Paucartambo, from the encroachments of the wild Chunchu Indians, and to explore the Madre de Dios. It was commanded by a Dr. Sevallos, who is now a very old man, retired to a farm in the Carabaya forests, but he has unfortunately lost his journal. General Miller made an expedition into the same region in 1835, and penetrated to a greater distance than any other explorer before or since. A very brief account of his journey was communicated to this Society;* but he possesses a much fuller and most interesting manuscript journal, which has never been printed. In 1852 Lieutenant Gibbon, U.S.N., entered the valleys of Paucartambo. In 1853 I explored a part of the course of its principal stream, the Tono, and communicated a brief account of my journey to this Society.† Another expedition to explore this region, under the sanction and with the aid of the Peruvian Government, was undertaken by some native adventurers, accompanied by a few Americans, and an English artist named Prendergast, in 1856, but it completely failed. Since that time the wild Chunchu Indians have continued to attack and encroach upon the few farms which existed in these valleys at the time of my visit in 1853, and at the present moment there is not one remaining. The rich valleys of Paucartambo, once covered with flourishing Spanish farms, have again become one vast uncultivated tropical forest.

II. Following the eastern slopes of the Andes to the south, we now come to streams which drain the valley of Marcapata. These were first explored by Jesuit missionaries; and, in modern times, an expedition, led by a native adventurer named Ochoa, penetrated to some distance in 1835. In about 1848, an Englishman, named Backhouse, who was employed by a wealthy Peruvian ‡ to collect chinchona bark in the Marcapata ravine, was surprised and murdered by the Chunchu Indians. The only printed account of this region which has come to my knowledge, is the journal of Ochoa, which appeared in a Cuzco periodical, called 'El Museo Erudito,' in 1837. The Marcapata river eventually falls into the Madre de Dios.

III. Lastly, and extending for a distance of 180 miles, from Marcapata to the frontier of Bolivia, is the watershed along that portion of the Eastern Andes, known as the Snowy Range of Carabaya, whence the numerous rivers take their rise, which unite to form the Ynambari. The Madre de Dios, Marcapata, and

* Royal Geographical Society's Journal, vol. vi. p. 174.

† Ibid., vol. xxv. p. 151.

‡ Don Manuel Costas, of Puno.

Ynambari, are thus the three great sources of the Purus. The tributaries of the latter drain the province of Caravaya, the region which was the scene of my recent wanderings, and which will form the subject of the present Paper.

The first mention of the province of Caravaya, or Colla-huaya, is to be found in the pages of the old Luca historian, Garcilasso de la Vega, who says that great quantities of gold were procured from the washings of its rivers. His account, which is quoted in my introduction to 'The Valley of the Amazons,' is fully confirmed by local tradition. It is said in Caravaya that, towards the end of the sixteenth century, a party of mulattos escaped from some Brazilian settlement, and discovered gold in the rivers of Caravaya. They sent a lump to the King of Spain, the size and shape of a bullock's tongue, which was lost at sea; but, in a little while, they sent another piece of the size of a bull's head, which arrived safely. Charles V. offered to comply with any request made by the mulattos, and they asked for the privilege of entering every town on white mules, with red trappings, and that the bells might be set ringing. To this day there are remains of trenches, bridges over rivers, and embankments, which are all said to have been the work of the Señores Mulattos. The Spaniards entered Caravaya in their footsteps, and the three settlements of Sandia, San Gavan, and San Juan del Oro, were designated by a *Cedula Real* as the "royal towns of the golden province of Caravaya." The Señores Mulattos were afterwards expelled for knocking a priest on the head while he was saying mass, and the wild Chuccho Indians destroyed the royal towns of San Gavan and San Juan del Oro; but the Spaniards long continued to extract gold from the rivers of Caravaya. During their domination, however, little was done in the way of settling or clearing any part of the Caravaya forests; a few coca estates, and subsequently coffee, were established in some of the ravines formed by spurs of the Cordillera; but after the destruction of San Gavan by the Chunchos, settlers never ventured into the open plains.

During Spanish colonial times Caravaya was a part of the Viceroyalty of Buenos Ayres, but since the independence it has been a province, under a sub-prefect, in the Peruvian department of Puno.

It was about 11 years ago, shortly after the discovery of gold in California, that Caravaya also attracted notice as a land rich in the precious metal, and it soon became the California of South America. In July, 1849, two brothers, named Poblete, in searching for chinehona-bark, discovered great abundance of gold-dust in the sands of one of the Caravaya rivers, and the news soon spread far and wide. Up to 1852 crowds of adventurers, among whom were many Frenchmen, continued to follow in the footsteps of the

Pobletes, but most of them returned empty, and the excitement has now died away.

The province of Carabaya consists of a narrow strip of lofty table-land, bordering on that of Azangaro; the snow-range of the Eastern Andes for a distance of 180 miles; and the boundless tropical forests to the eastward, stretching away towards the frontier of Brazil.

In approaching Carabaya from the plateau of the Great Lake of Titicaca, it is necessary to cross a spur of the mountain-chain of Vilcañota, called Accosiri, by a lofty pass at all times covered with snow. The descent on the eastern side leads to a narrow strip of table-land at the foot of the snowy-range of Carabaya, watered by the river Azangaro, which, after making an enormous curve, falls into the lake of Titicaca. This table-land is all the territory belonging to Carabaya, on the western side of the Andes; it is from 3 to 10 miles broad, and 180 miles long, and to the eastward it is bounded by the snow-range of the Carabayan Andes, with its sharp needle-like peaks rising up into the sky.

About a century ago, and after the destruction of San Gavan, the town of Crucero was founded on this table-land, as a central position for the capital of the province, and as being free from the attacks of wild Indians. It derives its name from the numerous roads which branch off from it to the villages on the eastern slopes of the Andes, and it is now the residence of the Sub-prefect and Judge of the province. It is a collection of mud huts, with a ruinous-looking church, containing a small image of the Virgin, of pure Carabayan gold. The snowy peaks appear quite close, to the north-east, and the river of Azangaro bounds the province at the distance of a league to the south. The narrow plain in which Crucero is situated is very swampy, covered with long tufts of coarse grass, *stipa ychu* (which yields pasture to immense flocks of sheep), and intensely cold. The plain is 13,000 feet above the level of the sea, and contains one other town, or rather wretched village, within Carabaya, and about 30 miles north-west of Crucero, called Macusani.

But the largest and only important part of Carabaya consists of the valleys and forests to the eastward of the Andes. On the western side that mountain-chain rises abruptly into peaks covered with snow, from an elevated plateau 13,000 feet above the sea; but on its eastern side the descent is rapid, into warm tropical valleys. Long spurs run off the main chain to the northward, gradually decreasing in elevation; and it is sometimes a distance of 60 or 80 miles before they finally subside into the boundless forest-covered plains of the interior of South America. Numerous rivers flow through the valleys between them, to join the Ynambari, and in these valleys, near the foot of the main chain of the Eastern

Andes, are the few villages and coca or coffee plantations of Carabaya. In these long spurs and deep valleys Carabaya differs in geographical character from the northern region of Paucartambo, where the Andes subside much more rapidly into the level plain.

In the warm valleys is to be found all the wealth and population of Carabaya. The population consists of about 22,000 souls, almost all Indians; and the wealth, besides the flocks of sheep on the western table-land, is created by the produce of coca, coffee, and chile pepper plantations, fruit-gardens, and gold washings. Correct statistical returns are unknown in Peru, but, as near as I could make out, there is an annual yield of 20,000 lbs. of coffee and 360,000 lbs. of coca. I could obtain no reliable statement respecting the yield of gold.*

The Carabayan valley which is furthest to the north and west is that of Ollachea, bordering on Marcapata, where there is a small village at the foot of the Andes. Next come those of Ituata and Corani, in the latter of which some Americans, remnants, I believe, of the expedition into the Paucartambo valleys in 1856, are busy washing for gold. The little village of Ayapata, near the source of the river of the same name, comes next; and 30 miles further in the interior an intelligent and enterprising Peruvian, named Don Agustin Aragon, has established a sugar estate, called San José de Bella Vista. It is situated at the junction of two rivers, and he is thus protected from the attacks of the savage Chunchu Indians, who prowl about in the surrounding forests. He has made a road, passable for mules, from the village of Ayapata to his estate, and he finds the manufacture of rum from the sugarcane far more profitable than digging for gold or hunting for chinchona-bark. He is a man full of energy and resources. His attempt to establish a manufactory of Indianrubber only failed through the refusal of the Peruvian Government to give him a contract for supplying the army, and thus assist his first efforts; this year he sent an expedition into the forests to collect wild cacao-plants; any scheme for developing the resources of the country is sure to receive his advocacy; and he looks forward with confidence to the day when a steamer shall ascend the Purus and Ynambari, and return with a cargo of the produce of Carabaya. It would be well for Peru if she contained many such men as Don Agustin Aragon.

It is supposed that the old Spanish town of San Gavan was

* The accounts are most contradictory; that which I have given above is from Don Pablo Pimentel, sub-prefect of the province. Don Manuel Costas, an eminent native miner and merchant, gives the amount at 80,000 lbs. of coca and 150,000 lbs. of coffee; and Lieutenant Gibbon, in his work, states it at 500,000 lbs. of coca and 1000 lbs. of coffee.

situated near a river of the same name, about 20 miles from Aragon's estate. The site is now overgrown with dense forest, and it has never been visited since its destruction, upwards of two centuries ago; but it is believed that vast treasures lie concealed amongst the tree-covered ruins, because the attack of the Chunchos was sudden and at once successful; they care nothing for the precious metals, and San Gavan contained a royal treasury, and was the central deposit of the gold of Carabaya. The Chunchos, in ancient times, were in friendly communication with, and even took service under the Spaniards; but the foolish tyranny of the latter at length exasperated them, and led to the destruction of San Gavan. Since that time the Chunchos have wandered in the forests in small tribes, the implacable enemies of all white men, or Inca Indians.*

Following the eastern slopes of the Andes to the south-east, the next village to Ayapata, at the head of another deep ravine, is Ccoasa, and next follow Usicayus, Limbani, and Phara. Phara is in a ravine on the eastern slope of the Andes, about 35 miles from Crucero, and on the road to the famous gold-diggings which were discovered by the brothers Poblete, and which attracted so many luckless adventurers into the forests between 1849 and 1854. The path lies along a ridge of the Andes to the northward, which gradually decreases in elevation for 70 miles, when the banks of the great river Ynambari are reached, at a spot which received the name of "Versailles," from some French gold-seekers. Between Phara and Versailles there are two resting-places, called Tambo del Ucco and La Mina; and for this distance the road is passable for mules. At Versailles the river Ynambari is crossed by a perilous rope-bridge, and the golden valley of Challuma is reached. The river of Challuma † falls into the Ynambari, on its right bank, and rises in hills completely isolated from the Andes. It is auriferous, and receives three small tributaries, the sands of which are full of gold, both in dust and nuggets. On its right bank there are some hills, consisting of quartz and other primitive rocks, where Don Manuel Costas erected a house, and brought machinery for crushing the quartz. The place was named Monte Bello by the Frenchmen, and is only about five miles from Versailles. Señor Costas is a native of Puno, a very intelligent and enterprising man, and a distinguished citizen, but he has failed in

* See my account of the Chunchos, in 'Cuzco and Lima,' in my paper on the sources of the Puma, in the Royal Geographical Society's Journal, vol. xxv. p. 151; in the alphabetical list of Indian tribes at the end of 'The Valley of the Amazons,' printed by the Hakluyt Society; and a fuller and more interesting one in General Miller's paper in the Royal Geographical Society's Journal, vol. vi. p. 174.

† *Challuma*, a fish—*Uma*, water; in the Aymara language.

this undertaking through the badness of his machinery, and the immense cost and difficulty of transporting materials through such a country. A few adventurers, however, still continue to wash for gold at Challuma. These gold-seekers have penetrated farther into the forests, and nearer to the main stream of the Purus, than any other explorers; and their discovery of the Challuma, and of the auriferous hills near its banks, has added something to our geographical knowledge of this region.

The remaining villages on the eastern slopes of the Caravayan Andes are Patambuco, Sandia, the largest and most important of all, Cuyo-cuyo, Quiaca, Sina, and the farm of Saqui, on the frontier of Bolivia. Their respective distances are as follow :—

	Miles.	Population.
Ollachea to Ituta	12	
„ Corani	10	
„ Ayapata	18	
„ Cconsa	10	.. .. 12,000
„ Usicayus	18	
„ Phara	20	
„ Limbani	8	
„ Patambuco	16	.. .. 1,000
„ Sandia	12	.. .. 4,000
„ Cuyo-cuyo	15	.. .. 2,000
„ Quiaca	21	.. .. 600
„ Sina	20	.. .. 600
„ Bolivian frontier	12	
Total	198	.. .. 20,200*

But some of these villages are at greater distances from the foot of the Andes than others: thus they are not in a straight line, and the direct distance from Ollachea to the Bolivian frontier is not more than 180 miles. The valleys in which they are situated are separated from each other by spurs of the Andes, many of them so wild and precipitous that they are quite inaccessible; and there is no means of passing from village to village, in many instances, without crossing the Andes to Crucero, and descending again by another pass. Thus Crucero is in the most central position, and, though in a bleak and intensely cold region, has been chosen as the site of the capital of the province.

Last April I entered the forests of Carabaya by the valley of Sandia, and extended my wanderings still further to the North and East. I therefore propose to describe those parts of the rich and beautiful province of Carabaya which I personally visited, in a somewhat more detailed narrative. The valley of Sandia is the

* To which must be added 1800, the population of Crucero and Macusani, on the table-land west of the Andes, making the total population of Carabaya 22,000 souls.

most important in Carabaya, and the village of the same name is 42 miles from Crucero.

The pass leading down from the summit of the snowy range of Carabaya to the valley of Sandia, is 20 miles to the north-east of Crucero, and 13,600 feet above the level of the sea. Here the parting of the waters takes place, between the Atlantic and the lake of Titicaca. On the left of the road a black perpendicular cliff rises up to a height of fully 1500 feet; and the space on its inner side is occupied by a glacier, the first I have ever seen in the Cordilleras, whence descends, in a long waterfall, the little river Huaccuyo, which dashes down a deep ravine. As the descent continues, the scenery becomes magnificent, the polished surfaces of precipitous cliffs glitter here and there with foaming torrents, some like lines of thread, others broader, and dashing over rocks; others seeming to burst out of the white clouds; while the jagged peaks, some black and frowning, others white with snow, pierce the stratum of fleecy clouds.

Descending for 16 miles through this glorious scene, the road at length crosses a ridge, and goes in precipitous zigzags down the deep ravine of Cuyo-cuyo, through a succession of terraced gardens, some abandoned, others cultivated with ocas (*oxalis tuberosa*), barley, or potatoes; while their walled sides are covered with beautiful flowers—celsias, calceolarias, begonias, a large purple solanum, and a great variety of ferns. But it was not until reaching the little village of Cuyo-cuyo, in the bottom of the hollow, that all the glories of the scene burst upon me. The river of Sandia, which takes its rise at the head of the ravine, rushes through it, and is bordered with ferns and wild flowers. Almost immediately on either side rise up the steep mountains, entirely lined by well-constructed terraces, at least a hundred deep, one above the other, faced with stone. In many places a cluster of cottages is built upon them, seeming almost to hang in the air; and, above all, the dark rocks shoot up into snowy peaks, which stood out against the blue sky.

A most lovely scene, but very sad; for the vast majority of these wonderfully constructed hanging gardens, monuments of the beneficence of the Incas, are now abandoned. This was a colony in the time of the Incas, and all the inhabitants had coca-farms in the lower and more tropical parts of the valley. The population of the Cuyo-cuyo ravine is now estimated at 2000 Indians. It is 10,517 feet above the sea.

A mile or two below Cuyo-cuyo its river unites with that of Huaccuyo, and at the confluence of these streams the valley of Sandia may be said to commence. The river is here a roaring torrent, dashing over boulders of rock, and descending rapidly

down the ravine towards Sandia. On either side vast masses of frowning mountains rear themselves up for thousands of feet, and terminate in fantastically-shaped peaks, some of them veiled in clouds. The vegetation increases in richness with the descent; very soon ferns of every shape, begonias, calceolarias, lupins, salvias, and celsias, appear in masses; and glorious waterfalls pour down the mountains on either side. Some of these cascades, in a white sheet of continuous foam for hundreds of feet, finally plunge into huge beds of ferns and flowers: others are dissipated in driven spray; and in one place a fall of water could be seen between two peaks, whose bases were hidden in the clouds, which seemed to fall into the fleecy waves. Eight miles below Cuyo-cuyo, maize begins to be cultivated, where the craggy jutting cliffs permit it, between the river and the mountains; the Indians living in eyrie-like huts, perched here and there amongst the maize-terraces, on almost inaccessible heights.

The village of Sandia is situated in this ravine, at a distance of 15 miles from Cuyo-cuyo, a dilapidated-looking place, with half the houses roofless and deserted. It is built along the banks of the river, and has a church and plaza. The mountains rise up all round the village to an amazing height, forming a close amphitheatre; and in two places pearly torrents foam down from the very summit of the mountains, and plunge into the bushes on a level with the town.

Sandia was one of the three royal towns which were founded in the time of Charles V., and the only one now remaining. The name is a corruption of "sandilla" (water-melon), the Spaniards having mistaken the gourds which abound in the ravine for that fruit. Sandia is 6,667 feet above the level of the sea, and 30 miles from the summit of the pass leading from Crucero, which is 13,600 feet in elevation. Thus there is a descent down the ravine of nearly 7000 feet. The climate is exceedingly agreeable, the days being fine and clear until late in the afternoon, during April and May, and not too hot. The prevailing wind blows up the ravine from the north-east, being the Trade which comes across the vast forest-covered plains of the interior. It is this warm Trade which produces a much milder climate and richer vegetation on the eastern than on the western slopes of the Cordilleras, at similar elevations.

The population of the ravine of Sandia, including Cuyo-cuyo, is 6000; but in 1855 an epidemic swept off 1000 souls. It consists almost entirely of Indians, who live high up on the surrounding mountains, some cultivating maize and potatoes, and others owning mules, which they let out on hire for the transport of the produce of the valleys to the markets. They are generally well off, and though they reside on the mountains near Sandia, each family owns

a small coca-farm in the more tropical parts of the valley, to which they all go at the season of picking and drying the leaves. These Indians are divided into six "ayllus," or lineages, a distinction which has existed since the time of the Incas. They are civil, obliging, and respectful; and four, who travelled with me for several weeks, were willing, good-humoured, always ready to help each other, intelligent, and invariably kind to animals. They were certainly suspicious at first, but this has naturally arisen from centuries of Spanish tyranny. The upper class in Sandia consists of half-castes, of Spanish descent, long settled there, who also own coca and coffee estates lower down the valley, and are comparatively rich. The sale of the produce of these estates, together with fruit, brings in a yearly income of 160,000 dollars. The "cesto," or basket containing 20 lbs. of coca, was selling at eight dollars.

The ravine below Sandia continues to be of the same character for many leagues—very narrow, with magnificent mountains rising up abruptly, and generally precipitously, on either side; the river increasing in size, and the vegetation in richness, with the descent. At a distance of 20 miles from Sandia, in a part of the ravine called Ypara, the coca and coffee plantations commence, at a height of 5000 feet above the sea. The stone terraces of coca rise up the sides of the mountains tier above tier, filled with the plants (*Erythroxylon coca*) with their delicate leaves and branches diversified by rows of darker-coloured coffee-trees with their crimson berries, and the sides of the terraces fringed with maiden-hair ferns and begonias. At intervals there is a hut, the temporary abode of the Indian who owns the coca, with a square, level drying-yard attached, perched up amongst the terraces, and half-hidden amidst orange and banana trees. The ravine is filled with masses of superb purple-flowered melastomas and orange cassias; while above the coca, and 5422 feet above the sea, there are fragrant chinchona-bushes of the most valuable species, growing with melastomas, andromedas and ferns, in shallow ravines surrounded by long grass. The river, in the bottom of the ravine, is fringed with tree-ferns, wild plantains, and bamboos. The whole view composed the most enchanting scenery I ever beheld. Round the lofty peaks floated the gigantic condor, and there were hawks, large doves, ducks, woodpeckers, humming-birds, and a large crow with a brown body, bright-yellow tail, and red breast, common in the Indian-corn. The rock in this ravine is a hard schist, much discoloured by red oxide, with veins of pure white quartz running through it.

After leaving the part of the ravine called Ypara cultivation ceases, and the river, now increased to double its former size by its junction with the Huari-huari, flows for many leagues between

mountains covered from their summits downwards with a dense tropical forest. This region is known as San Juan del Oro, once famous for its gold-washings; and here the royal town of the same name stood, founded by the Señores Mulattos, but long since destroyed and abandoned. The forests contain quinine-yielding cinchona-trees of valuable species, and, until the last thirteen years, they were frequented by bark-collectors.

While flowing through the forests of San Juan del Oro the river takes a turn to the westward, and at a distance of sixty miles from Sandia enters the Hatun-Yuncu, or great valley, where the people of Sandia have very extensive coca and coffee plantations. The curve here made by the river is so considerable that the people from Sandia reach their farms in the great valley by leaving the ravine above Ypara and making their way across the grass-covered mountains. Passing through the great valley, the river flows on past Versailles, where it receives the golden Challuma, and, subsequently, uniting with all the other rivers of Carabaya, becomes that great Ynambari, which finally effects a junction with the Madre de Dios, and forms the main stream of the mighty Purus.

Old Don Pablo Pimentel, the present kind-hearted and energetic sub-prefect of Carabaya, has personally explored the whole course of the river from Sandia to the junction of the golden Challuma.

The river Huari-huari, which is formed by two streams flowing from the villages of Sina and Quiaca, joins the river of Sandia about 30 miles below that town, and their united streams compose the river Ynambari; but the Huari-huari is considered to be its principal source. At this point I left the ravine of Sandia, and crossing one of the long spurs from the Andes, about 16 miles in breadth, entered another ravine to the east, which is watered by the river Tambopata.

The spurs from the Andes are lofty mountain-ridges dividing the valleys of Carabaya, and decreasing in height as they increase their distance from the parent chain. Their summits and portions of their sides are covered with long grass (*stipa ychu*), and are called *Pajonales* or pasture-lands. These broad expanses of meadow are dotted in all directions with thickets, some in gullies or shallow ravines, and others in clumps like those in an English park. These thickets contain the bush variety of the *Cinchona calisaya*, the most valuable species of quinine-yielding bark-trees, together with incense-trees, andromedas, melastomas, tree-ferns, and palms. The views from those pajonales are superb. Stupendous snowy peaks rise above a sea of mountain-ridges, and far below the deep ravines, with their rivers looking like lines of silver thread, surround the dividing ridge, and present a view of dense forest mingled with terrace-cultivation, of unequalled beauty. In the early morning white mists arise from the ravines and keep the

thickets of the *pajonal* saturated with moisture; but during April and May it is generally clear at noon.

The ravine of the Tambopata river is very different from that of Sandia, and, instead of coca and coffee cultivation, it is almost entirely covered with a dense virgin forest. The spurs from the Andes dividing the valleys, are covered with grass until they are about 40 miles distant from the main chain and 4000 feet above the sea; at a greater distance and lower elevation they are generally clothed with forest-trees to their summits.

The river Tambopata rises near a farm called Saqui, just within the frontier between Peru and Bolivia, at the foot of a ridge of the eastern Cordillera. After a course of 40 miles it receives the river of San Blas, on the banks of which the people of Sina have their coca-plantations; and 20 miles further on is a little clearing called Lenco-huayecu (the muddy ravine), at which point I entered the Tambopata valley. Here there are about twenty inhabitants—Indians with small clearings for the cultivation of coca, coffee, and sugar; but beyond this point all is virgin forest on both banks of the river, stretching away for hundreds, nay thousands, of miles.

I penetrated down the valley of Tambopata for a distance of upwards of 30 miles from the clearings at Lenco-huayecu; but it was a journey of the utmost difficulty, for the whole country from the summits of the mountains to the banks of the river is one dense, tangled forest, without a single open space a foot square, except a few stony beaches at the curves of the river. This forest contains trees of the most valuable species of quinine-yielding chinchona, copal-trees, and numerous others yielding valuable gums and resins, besides vegetable and bees' wax in abundance. There is a great variety of palm-trees—some useful from the hardness and excellence of their timber, others from their leaves, others from their edible fruits, and all remarkable for their grace and beauty. A list of the species of ferns would fill a volume.

The animals met with are jaguars, ounces, bears, peccaries, monkeys, deer, and some small rodents; of the birds, there are wild-turkeys, parrots, pigeons, a large handsome crow, hawks, and the superb crimson tinqui. The tapir is only found in the open plains.

The rock is a yellow clay-slate of the Silurian period, which, when exposed to the weather, is quickly converted into sticky mud; and lower down it is very brittle, and easily breaks off in thin layers. Veins of white quartz run through it.

During the rainy season, from November to March, the river dashes down the ravine with great fury, and piles up enormous heaps of timber on the stony beaches; but in the season from June to August it is fordable in several places, as low down as Lenco-huayecu.

At a distance of 30 miles from Lenco-huayccu is the mouth of the Yana-mayu; and 30 miles further down the ravine, the Tambopata unites with the river Pablo-bamba, on its right bank, at a place called Putina-puncu. The Pablo-bamba rises in a hill called Corpaychu, on the very frontier of Bolivia, and is only divided from the Tambopata, during its whole course, by a single range of hills. The ridge on its right bank forms the frontier of the two republics, though it has never been surveyed.

Below Putina-puncu, the united waters of the Tambopata and Pablo-bamba enter the vast forest-covered plains into which the spurs of the Andes finally subside, and henceforth its course is entirely unknown. I think it probable, however, that this river finds its way direct to the Purus, without previously uniting with the Ynambari.

Such is a brief account of the numerous streams which combine to form the great river Purus—from the Piña-piña in the forests of Paucartambo, on the extreme north-west, to the Pablo-bamba on the frontier of Bolivia. The streams flowing from the eastern Andes to the north-west of the Piña-piña combine to swell the Ucayali, while those to the south-east of the Pablo-bamba fall into the Beni, one of the chief tributaries of the Madeira. The intermediate streams are the sources of the unknown Purus; they are all more or less auriferous; they flow through forests abounding in valuable products, and through countries of inexhaustible capabilities; yet the courses of very few of them have been explored to a distance of 70 miles from their sources; and the main stream of the Purus, one of the principal affluents of the Amazon, may be said to be entirely unknown to geographers.

In this paper on the province of Carabaya, and in the preceding one, read before the Geographical Society, in 1854, on the valleys of Paucartambo, I have endeavoured to give a clear idea of the little that is known of the rich virgin country which is watered by the Purus and its tributaries; and thus to draw attention to one of those vast regions which are yet unexplored, and which offer an inviting field for the enterprise of modern geographers.

The map, which accompanies this paper, is merely intended to render it intelligible. I have not sufficient data to prepare an accurate map of the whole region of Carabaya, though I obtained one fixed position at Crucero, and took a number of cross bearings throughout my journeys in the valleys of Sandia and Tambopata. That portion of the map is therefore tolerably correct.

XIV.—*Explanatory Notes on two Maps of Patagonia.* By
MR. H. L. JONES.

Communicated by the FOREIGN OFFICE.

Boud, June 10, 1861.

SIR—

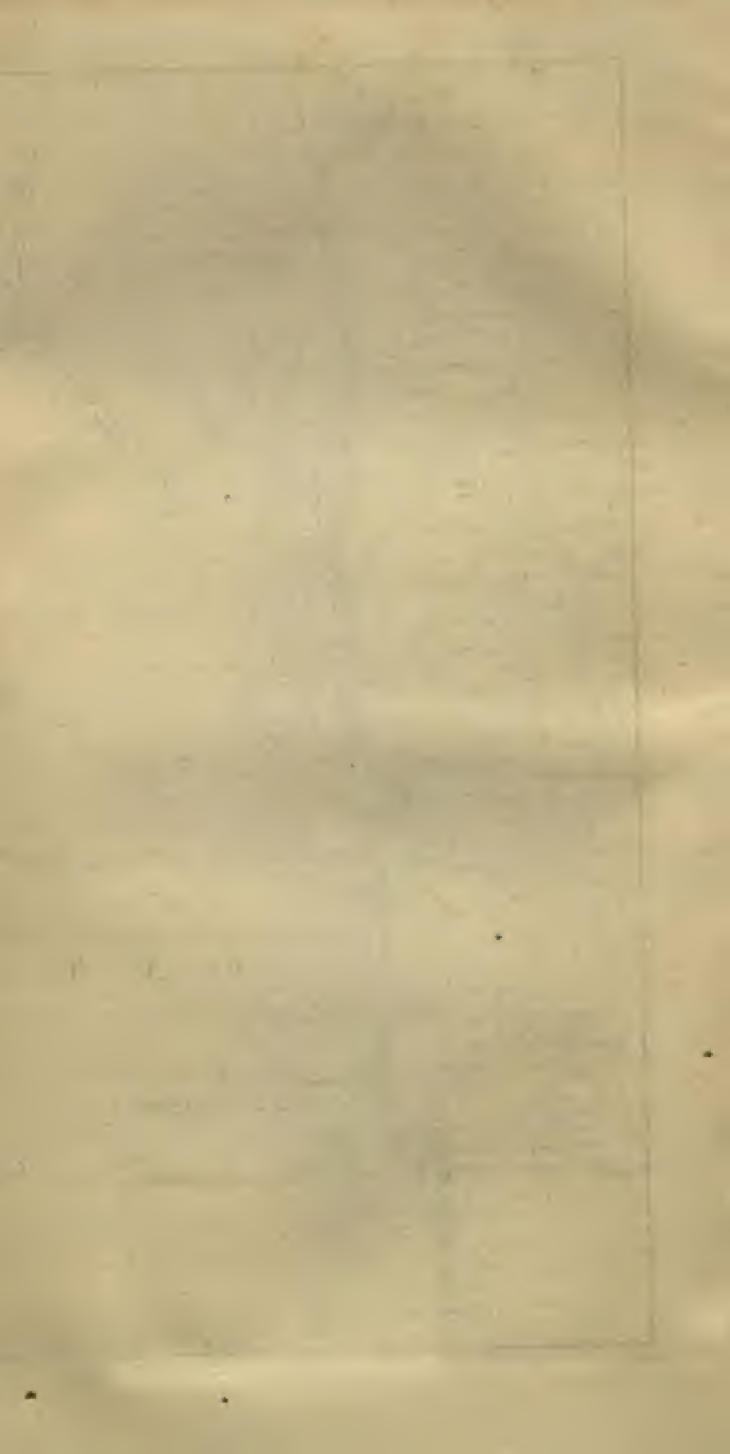
Buenos Ayres, 15th April, 1858.

I beg leave to present to your Excellency two maps, delineated by me, of the southern part of this Continent, from the Atlantic to the Pacific, as far as our present knowledge permits.

The part of the coast and country bordering the Atlantic is generally from my own knowledge and from several itineraries which I have procured during a long residence in these countries, having, between 1815 and 1828, made several journeys from the river Negro to Buenos Ayres by land. In my first journey in January, 1815, I remained more than a month in the tents of a friendly Cacique in the "Sierra de la Ventana," who detained me by the excuse of ensuring my safety in another tribe of Indians on the route. I employed myself in examining the neighbourhood of these mountains in every direction; to the west unto the Salinas. For many years I have had oiling establishments in the deep bays between White Bay and the Bay of San Blas. In Brightman Bay, the mouth of the river Colorado, Port Union, and the Bay of San Blas, I have had regular establishments, employing many men and horses, with small vessels. In consequence of my knowledge of this part of country, the Government of Buenos Ayres in 1828 entrusted to me the formation of a settlement or fort in White Bay. For years I had employed my endeavours to persuade the Ministers of the necessity of an establishment in this excellent port. I carried down the artillery and necessaries, and brought from River Negro the timber for the erection of the buildings. Before the arrival of a military force from Buenos Ayres, I had obtained, by treaty with the Caciques of the Telhuet Indians, the licence to form a fort, had examined this deep bay by sounding its channels, selecting the best spot for the establishment, and riding over the country in all directions.

The River Negro, from near its source in the Cordilleras to its entrance into the Atlantic, is delineated from the exploration made by Don Basilio Villarino, by orders of the metropolitan government, in 1782. I have laid down, to the best of my ability, the many courses and distances in the windings of this river from the Journal of this indefatigable man. I have marked the passes of the Indians, the falls and banks which impeded the navigation, and the continuance of the high cliffs which confine the narrow valley of alluvial soil brought from the Cordillera and deposited on the river-side. Some alterations have been made from the ex-





pedition of General Pacheco a few years ago, noted by Descalzi. In 1817 I made a journey up the River Negro as far as the island of Choelechel, in consequence of some peones from Patagonia having stolen the horses from my oiling establishment at San Blas. With an officer and some soldiers we examined the island, which is a resting-place of the Indians of the Cordillera, who steal cattle in the Estancias of Buenos Ayres. Learning that these men had crossed over northward to the River Colorado, a distance of 10 or 12 leagues, I found them, recovered my horses, and, following the stream of this last river, returned to San Blas.

The direction of the eastern branch of the Andes, called by Don Luis de la Cruz in his *Journal*, *Auca Mahuida*, between the River Colorado and River Negro, is taken from his work in 1806. These mountains always running southward, it is established, from Villarino's account, where they cross the River Negro and take the name of the Balchita Chain. To make the exploration of the River Chupat, in 1854 and 1855, I sent 140 horses from Patagonia, with Indians, guides, and peons, with a person capable of taking the courses and distances and making the necessary observations. I supplied him with what was necessary for the purpose. From the scarcity of water in the lakes by the drought so common in these countries, the guides found it necessary to follow up the River Negro nearly as high as the Island of Choelechel, and from thence to cross south-west to the Balchita chain of mountains. Among these mountains they journeyed to the Chupat. Only Indians had before performed this long journey, and the tract was quite unknown; it was performed in forty days. The chain is called Uttak by the Indians, and crosses the Chupat in a southerly direction.

The coast around the deep Gulf of St. Matthew and across to the Rio Negro is from a journey which I made on foot after my shipwreck in the Gulf St. George, in 1814. Leaving our boat at the entrance of the Bay of St. Joseph, we proceeded to Port San Antonio, and from thence across to the River Negro by compass.

The Peninsula of St. Joseph and the bay of the same name had been examined by me in every direction in 1816, in a sealing voyage with two schooners, when I brought horses from Patagonia with peons for the purpose of catching wild cattle to maintain the crew of the vessels.

In 1819, I took 36 horses from Ensenada with 8 peons to discover the number of cattle in the Peninsula of St. Joseph. I passed four months in this operation, surveying the country in all directions. We calculated their number to be upwards of 15,000 head.

In 1823, I formed a Company of four friends on shares, with a licence from the Government to kill the wild cattle. We brought

from Patagonia 100 horses with Indians, and from Buenos Ayres 40 peons. I remained nearly a year travelling all over the Peninsula and its neighbourhood. We killed about 10,000 head, the remainder abandoned the Peninsula, and, following the coast south around the spacious bay called New Bay, came to the River Chupat.

In November, 1814, I discovered by mere accident the spot where the River Chupat, or Chulilad, so called by the Moluches at its western part, enters the Atlantic. It had always been represented in the Spanish maps as far south, in the Bay of Camerones. As I have said before, I was shipwrecked in the Gulf of St. George, in my brig-schooner *Lovely Eliza*. Leaving thirty-five of the crew on Ship Island (or Island of Lions) short of provisions, I volunteered to proceed in a small boat we had saved, with six of the crew taken by lot, to Patagonia, to freight a vessel to save their lives in that barren spot, taking them to Buenos Ayres. Short of water in the boat, and in-shore we perceived in lat. $43^{\circ} 21'$ piles of dry willow-trees on the beach; landing, I found the mouth of the River Chupat.

The exploration of this river in 1854 and 1855 was made in consequence of my having formed a Company for the purpose of making a permanent settlement. This motive was what was held out to the public, and caused me to enter into it. I took down eighty men in the brig *Explorador*, and the brig-of-war *Maipú* was placed at my orders. I have said before, 140 horses were sent by land. After examining the river for 25 or 30 leagues and the chain of the Cordillera Uttak, the country about New Bay, and to the south for 15 or 20 leagues; after forming a deep ditch and four bastions, and erecting buildings to shelter 80 or 100 men, after passing risks, we were abandoned by the Company, maintaining ourselves by chasing guanacos with the Indian peons and horses. The works we had erected were destroyed. The reason of the abandonment was (as it was held out) that the cattle on the plains of the river had retired to the Uttak Mountains, having been persecuted by the Indians. Our horses from the plains of Buenos Ayres we found unfit on the rocky country among the mountains.

Motives which caused my endeavours to establish a permanent settlement on the river, and convinced me of its utility to the settlers and to society in general:—

1. I considered the alluvial soil on the River Chupat fit for cultivation, and to supply refreshment to vessels going round Cape Horn, or coming from the Pacific, which at present obliges them to enter into the Falkland Islands, far east of their course. I consider the entrance of the river has facility for vessels of 150 tons.

2. The vicinity of the river to New Bay, capable of receiving the whole of the British navy, where the largest vessels can enter

freely, and find sheltered anchorage. Three hours' run from the mouth of the Chupat, or half a tide, shows the distance of New Bay.

3. I calculated on the narrow breadth of the continent in this lat. $43^{\circ} 21'$; the distance from the Atlantic to the Pacific in the Gulf Encud, being in a direct line about 120 leagues. The Bay of Desengaño on the Atlantic side, and the Gulf of Encud on the Pacific, contract the breadth of the continent. It is proved, from Captain FitzRoy's observations, that the "Cordillera de los Andes," bordering on Encud, offer many passes, being, as he expresses himself no higher in many parts than the islands on the coast of the main land. That there are sheltered ports is also demonstrated in his works. Dr. Darwin, who accompanied Captain FitzRoy in the *Beagle*, after speaking highly of the advantages for a settlement on the Chupat, from its soil and verdure, concludes: "There is no necessity in showing the advantages to be derived in being able to open a communication across the continent by this river to Chiloe and Chile, which will tend to introduce civilisation, Christianity, and commercial intercourse."

4. The configuration of the globe demonstrates that this is the shortest course to Australia across the American continent. The time will come when the utility will be found, as shown in a work published in London in 1854 by Mr. Simmons.

5. My desire for forming a settlement also proceeded from a wish to be useful to the tribe of Indians, the Tuelches, for years faithful to me in these countries. They knew that we had a quantity of horses loose in the plains of the river; not one was stolen. Having sent some Indians with my peons up the river to speak to them, upwards of 200 men with their families, and bringing the articles they had on sale, arrived a day or two after our departure from the river. Finding the establishment destroyed, they followed the coast to New Bay, expecting that I had entered there, which was not the case.

6. From a cursory examination of the Cordillera "Uttak," I have no doubt it contains mineral productions, as well as volcanoes. I have discovered specimens to form this opinion, and the sides of the river abound with volcanic scoria, brought by the current. It must be remembered that Australia was settled upwards of eighty years before its gold and copper were discovered.

Your Excellency's obedient humble servant,

H. L. JONES.

*His Excellency W. D. Christie, Esq.,
H. B. M.'s Minister Plenipotentiary
to the Argentine Confederation.*

XV.—*Remarks on Vancouver Island, principally concerning Town-sites and Native Population.* By Captain W. C. GRANT, F.R.G.S., &c.*

Read, December 12, 1859.

VANCOUVER ISLAND is in itself so unproductive, in proportion to its extent, that its rise or fall as an important colony must in a great degree depend on the support which it receives from the neighbouring continent. Coal or even gold in its rocks, or fish in its seas, will scarcely be found to attract permanently the settlement of a large population, if corn and cattle for their subsistence are wanting. In fixing, therefore, on the site for its principal town, convenience of communication with the back country of British Columbia should be had in view, at the same time not losing sight of facility of intercourse with the outer world. Neither of these desiderata are, as it would appear to me, found in the site of Victoria, nor were they indeed contemplated when that site was first fixed upon. The few Canadians and Orkney-men, who some dozen years ago, under the able guidance of Mr. Finlayson, first planted there the row of palisades, since dignified by the name of a fort, little dreamt of the brilliant future which was awaiting the spot they had chosen. The considerations which actuated their leaders were, if I mistake not, the following:—1st, a safe and sheltered harbour for vessels of small tonnage; 2nd, a well disposed tribe of Indians; 3rd, a situation convenient for intercourse with Nisqually, and with sufficient open land near it whereon to form a farm for the subsistence of the servants of the establishment. The bare idea of such a vessel as the *Leviathan* being even talked of as being likely to be sent to their harbour, would have probably caused them to stand as much aghast as if the extinct monster whose name she bears had himself been borne in upon their view, riding on the swell of the Pacific. Nor did they, I suspect, contemplate the probability of any gold ever being seen in that locality, unless such as was imported by or for the "Company." Success in trade, and that within a very contracted sphere, formed the boundary of their highest aspirations. Now, however, the case is altered: more mouths are to be fed, more commerce to be fostered, more ships to be received; the wandering rays of British empire have at length penetrated to this distant colony, and the gloom of a savage region may hope to be illuminated by the sun of civilization. The island must be poor indeed if, under such a state of things, it cannot produce a better site for a chief city than the shores of Victoria

* See Arrowsmith's Map of Vancouver Island, in vol. xxvii. of the Journal of the Royal Geographical Society, to accompany Captain Grant's former Paper on the same.—Ed.

harbour. A bar runs across the entrance, making it impassable to vessels drawing over 20 feet of water: once entered, numerous obstructions of rocks and banks render the channel tortuous and unsafe without a pilot; the smallest schooner has to tack three times before arriving at the quay, and when arrived there, *i. e.* in the most spacious part of the harbour, six large vessels would with difficulty find convenient room for anchorage at the same time. Again, the supply of water is bad: none is procurable in the harbour itself, and the crews of vessels have either to go for a considerable distance up the arm, or to send boats round to the harbour of Esquimalt. Proceeding on land, here again the supply of water is indifferent: timber fit for building purposes is scarce, and the surface close to the sea is broken, rocky, and irregular. Leaving now the locality of Victoria, if the reader will take a sail with me through the canal de Arro, he will find himself in a few hours, in the harbour of Sanetch, some forty miles distant. Sanetch is a long arm of the sea, thoroughly sheltered, with deep water—few obstructions, and good anchorage, though at a somewhat long length of chain. It is almost immediately opposite the mouth of Frazer's River, at which place its natives own a fishing-ground: on its shores is a plentiful supply of timber of all sorts; near it is sufficient open land to begin with, and into it flows the Cowitslin, the largest river yet known on the island—a river also which flows through the largest known extent of open land, and that land with high agricultural capabilities. Thus far in search of a town-site, in connexion with the newly-discovered gold regions. Let us see, however, whether Vancouver Island cannot likewise support a town on her own resources; and if the reader will kindly now turn back with me, and proceed along the south coast of the island, I will try and direct his search. Passing Victoria, as already disposed of, and casting a glance at Esquimalt as somewhat more desirable, we arrive at Bucher Bay, which has nothing to attract us; and shortly after glide past Soke, with a sigh of regret that so beautiful a sheet of water, as is presented by its harbour, should contain so many villainous rocks and shoals, and that the large extent of ground on its shores should comprise so little available land. From thence we hurry on to Port St. Juan, which, though best situated, is neither sufficiently large nor sufficiently well sheltered; we at length drop anchor permanently in Barclay Sound (erroneously called Nittinat). Here the first thing is to discover the Alberni Canal, which, though I did not find it where I looked for it, no doubt is to be met with in some part of the Sound. The Indians, who accompanied my search in a canoe and who hailed from Chadukutl, ignored its existence; when I returned, however, to my schooner, which lay near the entrance of the Sound, Klayshin, an Upat sea-chief, declared that in the country of the Cojuklesatuch, *i. e.* towards the north-west

corner of the Sound, after paddling during two suns, and once while the moon gilded the stroke of your paddles, you arrived at a district called Nomatah, where, on a hill-side, coal was found in abundance, and cropping out from the surface of the earth. I regret that the springing up of a favourable breeze which carried me away on my voyage south, prevented my testing the truth of the communication thus made to me by the savage. This Nomatah, if his tale be true, must be situated on a navigable stream some 80 miles up in the interior; and, at the head of the navigation for large vessels of this stream or canal would, I should fancy, be the best situation for the commercial capital of Vancouver Island. The banks of a stream which could be navigable so far are probably somewhat level, and, if level, there is every possibility of these comprising a considerable extent of available land. Surely the noble expanse of Barclay Sound, some 10 miles broad at the entrance, and reaching for a still greater distance into the interior, which may be easily made in all weathers, and to which vessels attempting to make the Straits of Fuca are sometimes carried against their will by a north-west current, would furnish a more fitting termination to a long sea-voyage than is presented by the comparatively insignificant little port of Victoria; and the latter place does not possess sufficient other local advantages to compensate for the grand vital defect of being a "statio male fida carinis." Besides Barclay Sound, Clayoquot and Nootka both furnish better harbours than any to be met with on the Straits of Fuca, and it has yet to be seen whether their neighbourhoods do not also possess other advantages. One word in conclusion, concerning the native population. Poor creatures! their future presents a sufficiently miserable prospect: the grating of the chain-cable, when the anchor from the bows of the white man's ship first seeks a resting-place on their land, sounds their doom, and generally at no distant period. All attempts at amalgamation have hitherto failed; it does not seem good that their race should mix with that of the white man, or even that it should co-exist therewith. They are not, like the monarch of Israel, given the choice of the calamity by which they are to be annihilated; but famine, sword, and pestilence, alike pursue them. The salmon, on which they relied for subsistence, is caught by the white man, and by him pickled and exported; the camass, on which they almost equally relied, is exterminated as a noxious weed. Rum and the rifle are not backward in doing their allotted tasks; nor is the pestilence of the destroying angel wanting to complete the sum of their fate. The hope of the missionary and of the philanthropist may, indeed, tell a more flattering tale; but is it likely to be realized? Where the white man settles, there the red man disappears: "The noise of their songs shall cease," unless the Almighty Ruler of the Universe sees fit to alter the hitherto prevailing laws in such cases. Let him who

doubts me take a trip across the Atlantic, let him land at New York, and proceed across the entire continent of America, going up the Hudson and down the Columbia. He will find, in both Eastern and Cis-Western States, the aboriginal red man entirely extinct: on the plains a few Pawnees and Sioux may cross his path; in the Rocky Mountains, the Crows and Blackfeet will fly before him; near the head waters of the Columbia, the noble Pend'Oreilles, who never turn back to friend or foe, may thinly show themselves; further on the subtle Snake, who shows he has not forgotten to sting, and anon the wily horse-taming Cayoux, and the Cliketat, skilled to draw the bow. Thus in a journey of some 4000 miles, he may have seen perhaps 300 red men, and, had the whole native population which lined his path presented themselves to his view, he might have seen 17,000 souls, of whom the Sioux would be by far the most numerous and the Cliketats the least. On the lower waters of the Columbia they are almost as extinct as on the banks of the Hudson. Their habitation has been made desolate, "though they be sought for, yet shall they never be found again." Their villages have become "a place to spread nets upon," and the call for the names of a hundred tribes is answered alone by the westerly wind, as, passing through their leafy tombs, it whistles mournfully their coronach. In Vancouver Island the native population is numerous: the number of males is from 12,000 to 17,000; they are attached to their hereditary possessions, and, though quiet as long as there is room for both races, it may not be so when the white population begins to jostle them. When the Cowitshin are driven from their hunting-grounds, and the Clayoquotoch from their fisheries, some struggle may be anticipated: buying the land will not suffice as long as the rascals (?) cumber the face of the earth. Small as the progress is which has been made by the missionary in cultivating Christian virtues and kindly feelings among the dark men of the East, still less successful has he been with the children of the West. The nature of the red man is savage and perverse. He prefers war to peace, noise to quiet, dirt to cleanliness, and jugglery to religion. It should be a question for Government to consider, whether it may not be desirable to send at once, to guard against any contingencies that may arise, a battalion of one of Her Majesty's regiments from Canada, one wing of which should be permanently stationed on the island, and the other sent to the opposite mainland. When a generation shall be passed, no doubt a local corps may with advantage be raised. But however desirable it may be to inculcate upon colonies the advantages of self-reliance, proper assistance should not be withheld from them in their early stages; they must be protected in infancy, in order that they may be able to take care of themselves in maturity. In this the United States, who on other occasions are apt enough to

which in course of time, when means of communication are opened out, may no doubt be worked to advantage.

It is not probable that gold will be found in Vancouver Island in any quantities sufficient to repay the working of it, and, although there are some rumours on the subject, I am inclined to doubt its having as yet been found at all in the island. Gold is found in quartz, or on granite and other primary and metamorphic rocks: never in any other rock than quartz, nor lying on rocks of a secondary formation. I think it therefore extremely doubtful that the report should be true of any gold having been found near Victoria, or in any of the low districts of the island, where the soil is in general a black vegetable mould, supported on a subsoil of cold yellow clay, many yards in depth, and resting on sandstone of the coal formation. There is little quartz in the hills of Vancouver Island; the valleys slope too steeply, and where rivers exist they rush through their rock-bound channels too impetuously, to allow the accumulation of any auriferous deposit, either on their banks or on bars. I have not seen anywhere the singular red compact earth which is the invariable concomitant of all auriferous superficial deposits. Gold is, however, found in large masses in the quartz of Queen Charlotte Islands, which probably, ages ago, formed a continuous range with the hills of Vancouver. There can be little doubt that it exists in the mountains of New Caledonia, to the northward of where men are now looking for it, and also a little to the southward, where several years ago David Douglass, the eminent botanist, found enough whereof to make a seal. This occurred on the shores of Lake Okanagan, a beautiful lake, from whence the northern branch of the Columbia takes its rise. The Columbia rises in British ground, and it is much to be regretted that it was not made the actual, as it is the natural, geographical boundary between Great Britain and the United States.

XVI.—*Report on a Journey in British Columbia in the Districts bordering on the Thompson, Fraser, and Harrison rivers.* By
Lieut. RICHARD C. MAYNE, R.N.

Communicated by the ADMIRALTY.

Read, December 12, 1859.

Lieut. MAYNE to Capt. G. H. RICHARDS, R.N.

H.M.S. *Plumper*, Esquimaux, Vancouver Island,

July 7th, 1859.

SIR,

I have the honour to report that, in pursuance of your orders, I proceeded to Langley, and, taking the first steamer to Fort Hope, reached that place on the 23rd of April.

I left Fort Hope on the 29th, and reached Fort Yale on the same evening.

The part of the Fraser River between Forts Hope and Yale is so well known that I need not speak of it, except perhaps to say that several rocks must be removed before it can be made reasonably safe for steam navigation.

We left Yale on the 2nd of May, and followed the river trail to Lytton, which we reached on the 7th.

The distance by trail from Yale to Lytton is about 60 miles, and the ground over which the trail passes is the roughest on which I have ever travelled, the greater part of it being over sharp pointed rocks or granite boulders. Some of the ascents in the Great Cañon, which is 6 miles long, are from 30° to 60°, and nearly perpendicular over the water. The current in the narrowest parts I estimated at 15 or 16 knots an hour. During the whole summer this part of the river is impassable for boats going up; and though some few people have come down it in safety, a great many have perished in the attempt.

There is hardly any land fit for cultivation between Lytton and Yale. There is a small flat at Spuzzum and several above Boston Bar, but they only average 200 or 300 yards long by 50 or 60 wide, and are almost all thickly timbered and covered with granite boulders. The largest one is about 9 miles below Lytton and is fenced in. It is about 1000 yards long by 400 yards wide, well covered with grass, but very sandy soil.

From Yale to Boston Bar the vegetation is limited to pine-trees and a few alders, wild onions and vetches growing among the rocks. Above Boston Bar it improves, and on the flats before-mentioned there are currants, cherries, gooseberries, and Oregon grasses in considerable quantities, and willows and maple in addition to the pine and alder.

About 2 miles above Boston Bar we found a bed of fine clay-slate running in an easterly direction, dip ranging from 5° to 40°, strike about 25°, and about 3 miles further on we came to a bed of limestone, the only one we saw between Yale and Lytton. The surface was very small. With the exception of these two beds and a very small surface of clay-slate close to Spuzzum, we saw nothing but granite both in the mountains and in boulders of every shape and size, some at Wellington Bar being 10 or 15 tons weight.

There is a ferry at Spuzzum and another at Boston Bar. The former it is not necessary to cross travelling on foot, but the latter must be crossed to get to Lytton.

There are several "Restaurants" along the road (every place where anything can be got to eat is called a restaurant in this country), where tea, coffee, bread, bacon, and beans can be got, as well as a plank to sleep on; and these places are at such distances apart that no man possessed of any money need sleep out.

At Chapman and Boston Bars there are large stores belonging to the express-men Messrs. Wells, Fargo, and Co., and Ballou.

The mule-trail leaves the river at Yale and meets it at Spuzzum, crosses it there, and again leaves it until reaching Lytton. It was blocked up by snow when I went up.

Lytton is at the forks of the Thompson and Fraser rivers on the south bank of the former and east of the latter, and is composed of eight or ten stores and a Government House. The site of the town is nearly 300 feet above the river on the upper of two benches, the lower of which is about 200 feet above the water. The bank on the opposite side of the Fraser is in three benches, the highest being about 600 feet, and the river is 576 feet wide at this season. The opposite bank of the Thompson is about the same height as Lytton. The Thompson River is about 150 yards wide at its mouth, and there is a horse-ferry across it for trains going to the Fountain, &c., &c. It is always blowing hard from north or south, the latter wind prevailing in summer, and the clouds of dust which continually sweep across the flat make it anything but a desirable spot for a residence.

We left Lytton for Kamloop, a post of the Hudson Bay Company, on the Thompson River, on the afternoon of the 9th of May, and followed the south bank of that river for 9 or 10 miles, when we ascended a steep hill for about 1½ miles, and came to a valley extending about 10 miles to the eastward, well covered with grass and hemmed in by hills 700 or 800 feet high. From this point the aspect of the country became much more promising than the Valley of the Fraser. After traversing the whole length of this valley we went down upon the Nicola River, and fording it, followed its left bank till we came to the Nicola Lake.

The Nicola River is far prettier than any others I have seen in the country. It is very rapid and full of small islands and sandbanks, and winds along in reaches of about half-a-mile long. At each bend there is a flat of 5 or 6 acres of clear grass-land, which would be very valuable were they not constantly flooded in summer. In some places the banks are high enough to prevent this, but generally the soil does not appear to be so good as where the banks are low, and the rise of the river is so different in different years that it would require a residence of several summers to know which are flooded and which are not. Another great drawback to agriculture is a deposit of nitrate of soda, which, though we first noticed it here, appears more or less through all the country. Mr. McLean, the officer of the Hudson Bay Company, in charge of Fort Kamloop, told me that where it is in large quantities it destroys wheat, but that it has very little effect on vegetables.

Behind the flats the mountains rise from 500 to 1000 feet, but though some are bluffs of trap and sandstone, far the greater number are covered with grass nearly to their summits.

The banks of the Nicola are for the most part of clay, nearly perpendicular, and averaging about 20 feet high, but in some places they are 150 feet and in others only a few inches above the water even at this season, and lined with poplars and willows. The bed of the Nicola is much higher than that of the Thompson, there being about 1100 feet difference between the places where I left the latter and joined the former.

About 15 miles before coming to the Nicola Lake there is a valley extending to the northward, 5 or 6 miles wide. It is not quite level, but the soil appears good, though, like all this country, too sandy for an Englishman's notion of rich land. It is well covered with grass, and there are not more than ten or fifteen trees to an acre. The hills bounding it are from 700 to 1000 feet high. The Indians say there is a lake in it running nearly parallel with Nicola Lake.

The Nicola or Smeehāntlon lies nearly north and south, and is about 14 miles long by 1 to 2 wide. The banks are low and covered with grass on both sides. There is not much good land on the west side, but on the east there are two large valleys, with apparently good land in them, down which run the rivers Rodimon and McDonald. Granite here for a time supersedes the sandstone and trap, and at the north end of the lake on the west side there are some very steep cliffs of it.

After passing the Nicola Lake we went along a good place of prairie by the side of a chain of small lakes or ponds, which continues till it joins the Thompson nearly opposite Kamloop. Stump Lake, or Lake Hamea as it is called by the Indians, is the largest of this chain, and is about 6 miles long by 1 to 1½ wide. After passing this, which is about 5 miles above Nicola Lake, we ascended Mount Skyetaken, at the top of which we were by the barometer 3600 feet above the level of the sea. This was the greatest height attained during our tour. The view from this mountain was very fine, extending as far as the Semilkamen Valley and Little O'Kanagan Lake, and showing a very large tract of grazing, if not farming, country. After crossing Skyetaken we passed a succession of low grassy hills, and descended to the Thompson River

opposite Fort Kamloop, and, crossing the river in a canoe, reached the fort about 10 o'clock A.M. on the 14th of May.

Fort Kamloop is situated at the forks of the Thompson and North rivers, on the north bank of the former and the west bank of the latter, and is one of the prettiest sites in the country. It is at the east end of a prairie about 10 miles long by 1 to 2 miles wide, which would be very valuable land were it not so low that it is always flooded in the summer. The year before last the fort itself was flooded so much that it had to be abandoned until the water fell.

The Thompson was about 300 yards wide at Kamloop when I was there, and the North River 320 yards. There is nothing of the rushing current here that there is in every other river we met, and in this river also lower down; and the contrast is so great as to give quite a sluggish appearance to the river, which quietly winds along about 3 knots an hour, though of course it must be much more in Midsummer.

Mr. McLean considers the soil here as good, though not so fine as at the head waters of the Thompson, about 22 miles east of this, or in the Semilkamen Valley, which he considers the best place in the colony for an agricultural settlement. The land about Fort Alexandria where he resided for several years, he also considers better than this, though more subject to frost. But I believe it is a great though common error to suppose that crops are destroyed nearly every year by frost at places even further north than Alexandria, once in four or five years being a fair average. Great quantities of potatoes are grown at the head of both Thompson and North rivers by the Indians, but nothing else has been tried. At Kamloop vegetables of all kinds thrive very well. A bushel of wheat there yields on an average 15 bushels. Mr. McLean says that at Alexandria he has known it yield 40.

There is considerable trade now carried on across the American frontier, and through Kamloop to the Fraser, and to the small rivers branching off from the Thompson, on nearly all of which there are or have been miners working. A great quantity of spirits and other things were smuggled into the country this way last year.

Gold has been found in the rivers Tranquille, Defont, Nicola, and Nicolaen, and silver in the latter, by Mr. McLean, and I believe he sent the first gold that was found in British Columbia from the last-named river. He assured me also that he had seen copper obtained by the Indians from a mine on the north bank of the Shuswap Lake, so pure that they made arrow-heads, pipe-stems, &c., of it.

There is a trail from this to Fort Hope which is always used by the servants of the Hudson Bay Company for transporting their goods to and from the northern parts. It is, however, dangerous in some parts, and a number of horses are lost each time the fur-brigade comes down. There is a bad swamp 7 or 8 miles long, and a steep mountain, Manson Mountain, both of which they have to cross. It takes them ten or fifteen days to go from Kamloop to Hope; but I am told that, travelling without luggage, it could be done in three or four days. A man has gone from Kamloop to Langley in five days.

The Indians all over the country suffered fearfully from want of food last winter, a great many dying of starvation. It was owing in a great measure to their improvidence, most of them leaving off the fishing, hunting, &c., last summer in the general mania for gold-digging, and making no provision for the winter. This state of things accounts for the number of thefts perpetrated on miners and others by them, their only choice in most cases being to steal or die. I think they can hardly be wondered at for preferring the former.

We left Kamloop for the Pavillon on the 17th May, and rode along the north bank of the Shuswap Lake as far as Tranquille River; after fording

which we ascended a steep hill to the northward and opened about 3 miles of very nice grass-land, and then coming down again followed the lake to the copper-mine, at the foot of which we camped. It is in a bank of about 800 feet high that the copper is found, but we searched from top to bottom without finding any, though everything was coloured with it.

The road along the north side of Shuswap Lake is very rough, the hills sloping down to the edge of the lake. After about five hours' riding we reached the river Défont, across which we had to swim the horses, an undertaking which the force of the current makes both difficult and dangerous to perform, though the river is only 20 or 30 yards wide. The west bank of this river is about 250 feet high, on ascending which there is a grass plain 5 or 6 miles long, and from that to the River de la Cache is all good grazing-ground, and indeed I might almost say all the way to the Pavillon. There is a small stream two yards wide between the rivers Défont and De la Cache, which is dignified by the name of Conteaux River, and here we left the Thompson and turned a little northward, the river running away to the southward.

All the Thompson River from the Shuswap is very much like the Nicola, but larger and not so pretty. The soil near the River de la Cache is very good, but covered with soda. The river is small and shallow, but just above where it joins the Bonaparte being the best ford in that river makes it a good place for a revenue station, as the Bonaparte River must be crossed in going to either Fountain or Pavillon, except by going round to Lytton, where there is a magistrate.

We crossed the Bonaparte River on the morning of the 19th May, finding only 3 ft. 6 in. of water in the deepest part of the ford, which was an agreeable surprise, for we expected this to have been the worst of all the rivers as it was far the largest we crossed between Kamloop and Pavillon, and we had been told the deepest. We skirted along a steep hill on the north side of it, down which one of the pack-horses fell, though fortunately without injury, and we then came down again on the river. This hill would be avoided if the river were bridged, as the bridge would be thrown across higher up, where the trail crosses the stream in winter, but the river at this season is too deep for fording at that part. The valley of the Bonaparte is not quite so much covered with the nitrate of soda as the other valleys we passed through; indeed, neither the Bonaparte or Chapeau valleys contains so much of it as those of the Thompson and Nicola.

We followed the north bank of the Bonaparte for about 7 miles till we met the Chapeau River, from whence we followed the Chapeau for 12 miles, crossing the river several times. The Bonaparte turns northward after its junction with Chapeau to Lake Loon, in which I believe it takes its rise.

The Chapeau River is a remarkable one, though only 10 or 12 yards wide, inasmuch as it and the Thompson make an island of about 25 square miles of country, in the same way that the Nicola and Thompson make one of 40 square miles farther south. After leaving the Bonaparte it turns westward for about 12 miles, and then turns southward, joining the Fraser about 18 miles above Lytton. Its banks are from 20 to 60 feet high, and the valley averages 800 yards in width. Here the limestone commences, and from this to Lake Pavillon there is hardly anything else.

Leaving the Chapeau we turned north, and through a narrow valley between perpendicular limestone mountains 4000 to 5000 feet high, and came to a small lake (Crown), immediately beyond which is Lake Pavillon, which is about 6 miles long and $\frac{1}{4}$ of a mile wide. At the north end of this lake there is a most curious peak like a round tower, called by the Indians Skille Paa-lock; and about a mile farther on is a farm of about 20 acres, on which three Americans are at work. They had not tried grain when I was there, but said they thought the soil good. Four miles more along the north bank of the

Pavillon River, which runs from the lake to the Fraser, brought us to the Pavillon itself.

The Pavillon is on the east bank of the Fraser, on a bench 600 feet above the river, very similar to that at Lytton. The wind blows and the dust flies in the same manner. There is one wooden house and several huts of canvas and boughs, which, like their log contemporaries in the Cañons, are called restaurants. Flour was 35 cents per lb. and bacon 75 when I was there. In the winter flour was as high as 85 cents, and bacon 1 dollar 50 cents.

The charges for carriage of goods, &c., now are from Pavillon to Kamloop 25 cents per lb.; to Fountain, 6; to Cayoush, 8; and to Big Bar, 8. From Lytton to Big Bar 30 cents. Big Bar is about 18 miles above Pavillon. Silver and copper have both been found at the Pavillon; the latter I have seen.

We left Pavillon on the 23rd of May, and walked by a very good trail to the Fountain. The Fountain, so called from a small fountain there, is a very much prettier and better site for a town than Pavillon: the latter, however, possessing the great advantage of limestone, none of which I saw at the Fountain, though I do not doubt there is some not far from it.

There is a considerable bend in the river at the Fountain, which shelters it to a considerable extent from the north and south winds. There are two or three large stores here, and some half-dozen log-huts scattered over the flat. There is a valley at the west end of the flat which extends southwards as far as Foster Bar, and through which there is a good trail.

About 3 miles below Fountain, on the opposite side of the Fraser, is Bridge River, where there is a large store belonging to Messrs. Fraser and Davis, who have thrown a wooden bridge about 40 yards long across the river, 800 yards from its mouth, for crossing which they make the miners pay 25 cents a head; they having, I am told, pulled down a bridge the Indians had made, and on which it was quite safe to cross. About 1½ mile below this is French Bar, where there is a ferry, by which we crossed; and 2 miles farther, on the west bank of the river, is situated Cayoush.

Cayoush is at the junction of the Tukumeth and Fraser rivers, where the Harrison Lilloet route commences, and is the prettiest place I saw on the Fraser. Four or five huts, and the same number of stores, compose the town on the west side. On the east side the Hudson Bay Company are building a fort, to be called Fort Berens. It is to stand on the lowest of three benches, into which the bank is divided about 50 feet above the water. There is a ferry at Cayoush, and a trail on either side of the river to Lytton. The drawback to the one on the west side being that the Tukumeth is not always fordable. On the 24th May we again left the Fraser, and struck down the Harrison Lilloet route, and, following the Tukumeth, camped at the north end of Lake Seton, where there are a few huts for the boatmen who ply on the lake.

The following morning we crossed Lake Seton in four hours, and Lake Anderson the same afternoon in five. The two lakes are about the same size, and have much the same appearance, but Lake Anderson tends much more to the southward than the other. Both are bounded by steep mountains 3000 to 5000 feet high, and both are very deep. There is no perceptible current in them and hardly any rise and fall. Southerly is the prevailing wind, and it blows nearly always during the day, the morning and evening being calm. These lakes are separated by a neck of land 14 miles wide, which is nearly level, and through which runs a stream 20 or 30 yards wide. Port Anderson is at the south end of Lake Anderson. There is a large restaurant there for the entertainment of muleteers, &c., &c.

From Port Anderson to Port Pemberton is the Birkenhead Portage, or, as it is now generally called, the Mosquito Portage, which name it certainly well deserves. It is about 25 miles long by the trail, which is on the whole good.

There are regular trains of mules on both this and the next portage. When I was there they charged 8 cents per lb. for packing along this one, but in the winter it was 12 cents.

About 9 miles from Port Anderson is Summit Lake, which is a mile long, and from which the waters run north and south. It is about 800 feet above Port Anderson and 1800 feet above the sea. Half-way between ports Anderson and Pemberton there is a large bed of clay-slate nearly 2 miles long. There is a river, called the Scaarluz, running the whole length of this portage. The banks are low and covered with willows, &c., and many small streams run into it on both sides. The valley of the Scaarluz averages about 1500 yards in width, except at Port Anderson, where it is nearly 2 miles wide. It is bounded by mountains 1000 to 5000 feet high, and generally very steep. There were quantities of wild peas, lettuce, and berries on all the level spots. There are only two valleys of any size running off from it, one near Port Anderson on the east side, and the other near Port Pemberton on the west.

We reached Port Pemberton at 11 A.M. on the 27th. Port Pemberton is on the north bank of the Lilloet Lake, and contains half-a-dozen restaurants and huts occupied by muleteers and boatmen. There is a large flat on the lake opposite to it, which dries the whole way across in the winter, and goods have to be landed a quarter of a mile lower down, but at this season there is a passage wide enough for a boat to come up to a wharf which has been built abreast the town. About 2 feet is the extreme rise and fall on this lake, and there is never any perceptible current.

We left Port Pemberton at 3 o'clock the same afternoon, and arrived at Port Lilloet about 7:30 p.m. We were treated on our arrival there to the first rain that had fallen on the lake this year, and it continued all night. There is only one store and an old barn at Port Lilloet. We left Lilloet next morning for Port Douglas by what is called the Douglas Portage. There is a small lake, or rather a continuation of the larger one, for about 4 miles from Port Lilloet; and from the south end of this, Little Lilloet Lake as it is called, flows the Lilloet River, the mouth of which is at the Great Harrison Lake about a mile below Port Douglas. At this season the Lilloet River is entirely unnavigable, on account of several dangerous rapids, in one of which there is a fall of 10 or 12 feet, but in the winter considerable quantities of goods were brought up the river in canoes, with a great saving of expense to the merchants, the Indians charging 5 cents per lb. from Port Douglas to Port Lilloet, when the mule-trains were charging 15 cents.

Following the east bank of this river about 8 miles we came to the hot spring (St. Agnes' Well). The temperature of this spring is, I should think, about 160°, but the thermometer we had with us when we were there was only graduated to 120°, and it went up to that instantaneously. It flows in a small stream from the centre of a large knob of conglomerate rock (specimens of which I have sent among others to his Excellency the Governor) into a basin at the foot of the rock. I brought a bottle of it down with me, but the quantity was not sufficient for analyzation.

We camped that night (29th) at the Akotzstar River, and reached Port Douglas at 3 p.m. next day.

We observed no new features on the Douglas Portage, and no limestone since leaving Pavillon.

The Lilloet River is very rapid, averaging 80 to 90 yards in width, but varying from 30 to 120 yards. There is a large stream called the Amockwa running into it from the southward about 9 miles below Port Lilloet, and another from the same direction called the Zoalkleen about 10 miles above Douglas. This latter is said to come from a lake called Zoalklinekt. The trail passes over many steep places which I think might have been avoided;

but as Lieut. S. Palmer, an officer of the Royal Engineers, is examining it more fully than I did, with a view to making alterations in the route, it is needless for me to make any remarks on this subject. The cedars on the side of the hill above Port Douglas are the finest I have seen in the country. I was told by a Frenchman that he had found gold-bearing quartz about 10 miles above Port Douglas.

Port Douglas is situated on a flat at the head of a small lake about a mile long, which is called Little Harrison Lake. In summer the water rises some distance over this flat; I am unable, however, to say how far, as the water was not at its highest when I was there; but even then some of the houses had two or three feet of water under or in them, according as they were built on piles or not.

Between the Little and the Great Harrison lakes there is a narrow passage nearly half-a-mile long. In summer there is sufficient water in it for the flat-bottomed steamers to go through, but in winter there are only four or five inches, and it is generally frozen over.

The Great Harrison is the largest of the chain of lakes. It is about 30 miles long and in some places 5 or 6 miles wide, in appearance much similar to the others. There are two large valleys on the E. side, one running N.E.W., and the other S.W. The latter is said to extend nearly to Lytton.

There is a stream running down it which I think takes its rise in the Cayoush Lake. At the entrance to the Great Harrison Lake there is a flat, which, like the small passage at its head, dries or nearly dries in winter, thereby blocking out steamers for at least seven months in the year; so that during the winter all goods have to be landed at the entrance of Harrison River, and taken up the lake in boats. This difficulty may be overcome, either by making a canal for the river steamers to pass through, or by making a road from the entrance of Harrison River to the south end of the Great Harrison Lake, and keeping a steamer inside the lake to carry the freight to Port Douglas; or it may be found better to cut a road from the Fraser River through the valley of the south end of the Great Harrison Lake, avoiding Harrison River and the flat altogether. One of these three things must be done if the Harrison Lilloet is to be the high road to British Columbia. It is thought that the opening of a road from Fort Hope to Boston Bar will cause the valley of the Fraser to be used for transporting goods into the interior; but I think this a mistake, except of course as far as the mining bars between Yale and Lytton are concerned. In the first place Lytton is not in so central a position with regard to the mining-regions as Cayoush, Fountain, or Pavillon. And the trail from Fountain to Lytton is much better from Boston Bar to that place.

Gold has now been found in large quantities at Alexandria, and from Pavillon there is a trail through a valley parallel to the Fraser, along which a wagon might be driven nearly the whole way.

There is gold in almost all the tributaries of the Thompson River also, and the road from Kamloop to Fountain or Pavillon is much better than between Lytton and Kamloop.

The country about Chilcoaten is, I am told, very good. A Canadian residing at Pavillon informed me he had travelled from Fort Chilcoaten to the lakes on Bridge River, through a valley parallel to the Fraser, and he knows an Indian who has been from thence to Port Douglas by a route leading down the valley east of the Lilloet; and both of these routes he describes as being over good land, and such as a road might be made on without great difficulty.

Between Fort Chilcoaten and the sea there is a chain of mountains through which there are two known passes, one by the West Road River, up which Sir A. McKenzie went, and the other at the head of Chilcoaten River, which

has never yet been crossed by a white man. When Mr. McLean was at Fort Alexandria he received a letter from the *Beaver*, lying in North Bentinck Arm, in three days by the latter route.

The change of temperature is very remarkable in British Columbia. I have seen the thermometer at 31° at daylight in the shade, at noon the same day 85°, and 40° again in the evening. I append a table of meteorological observations taken during my tour, as well as those taken on board H.M.S. *Plumper* at the mouth of the river during the same period. The absence of animal life is also very remarkable. The only birds we saw were about half-a-dozen partridges, a few humming-birds, American robins, and one or two other species of small birds. There are rattlesnakes in the country, and the chief of the Shuswap Indians told me that his people were frequently killed by their bite; but we saw only one.

I have sent, according to your order, to his Excellency the Governor the geological specimens collected by Dr. Samuel Campbell. A small collection of plants made also by that officer has been given to Dr. Wood.

I cannot close this without expressing my sense of the great obligation I am under to Dr. Campbell, n.s., for his zealous and hearty co-operation on all occasions.

I have also to acknowledge with pleasure the great kindness I received at the hands of the gentlemen of the Hudson Bay Company wherever I met them.

ABSTRACT of BAROMETER, ATTACHED THERMOMETER, and TEMPERATURE
of the Air.

Date.	Time.	Barometer.	Attached Therm.	Temp. of Air.	Date.	Time.	Barometer.	Attached Therm.	Temp. of Air.
1859.					1859.				
April					April				
1	Noon	30·37	50	47	15	Noon	30·42	53	51
	Mid.	·37	49	44		Mid.	·22	53	46
2	Noon	30·43	54	48	16	Noon	30·20	62	49
	Mid.	·38	51	44		Mid.	·17	54	47
3	Noon	30·47	49	49	17	Noon	30·28	59	51
	Mid.	·45	52	43		Mid.	·13	55	43
4	Noon	30·46	59	53	18	Noon	30·16	59	49
	Mid.	·40	55	46		Mid.	·16	54	43
5	Noon	30·56	55	51	19	Noon	30·34	54	49
	Mid.	·17	53	41		Mid.	·34	51	38
6	Noon	30·13	59	51	20	Noon	30·30	55	52
	Mid.	·03	57	47		Mid.	·19	55	41
7	Noon	29·97	57	47	21	Noon	30·13	59	59
	Mid.	·78	53	47		Mid.	·08	56	44
8	Noon	29·76	55	48	22	Noon	30·04	59	56
	Mid.	·74	50	45		Mid.	·02	55	48
9	Noon	29·77	56	47	23	Noon	29·93	60	55
	Mid.	·67	47	43		Mid.	·86	57	45
10	Noon	29·63	48	45	24	Noon	29·86	51	54
	Mid.	·75	46	42		Mid.	·99	56	57
11	Noon	30·02	50	43	25	Noon	30·16	55	52
	Mid.	·04	43	32		Mid.	·19	56	50
12	Noon	30·15	53	42	26	Noon	30·22	54	50
	Mid.	·26	51	43		Mid.	·11	54	47
13	Noon	30·48	58	45	27	Noon	30·03	52	50
	Mid.	·53	53	46		Mid.	29·99	51	44
14	Noon	30·62	59	48	28	Noon	30·08	52	47
	Mid.	·57	57	48		Mid.	·08	57	45

ABSTRACT OF BAROMETER, &c.—continued.

Date.	Time.	Barometer.	Attached Therm.	Temp. of Air.	Date.	Time.	Barometer.	Attached Therm.	Temp. of Air.
1859. April					1859. May				
29	Noon	30·06	54	49	26	Noon	30·25	62	64
	Mid.	29·93	53	47		Mid.	·03	59	54
30	Noon	29·96	56	51	27	Noon	29·98	64	62
	Mid.	·94	53	41		Mid.	·87	61	56
May					28	Noon	29·90	60	55
1	Noon	29·92	59	53		Mid.	·91	56	53
	Mid.	·93	56	53	29	Noon	29·99	49	52
2	Noon	29·85	64	60		Mid.	·98	57	51
	Mid.	·88	58	50	30	Noon	29·95	60	57
3	Noon	29·95	63	58		Mid.	30·10	57	50
	Mid.	30·08	58	51	31	Noon	30·40	61	54
4	Noon	30·31	59	50		Mid.	·40	56	49½
	Mid.	·28	53	45	June				
5	Noon	30·13	54	58	1	Noon	30·35	59	57
	Mid.	29·93	58	57		Mid.	·15	59	55
6	Noon	29·90	55	55	2	Noon	30·10	59	57
	Mid.	·94	57	52		Mid.	29·96	61	57
7	Noon	29·92	60	57	3	Noon	29·97	66	65
	Mid.	·78	55	49		Mid.	·86	64	61½
8	Noon	30·65	57	52	4	Noon	30·22	63	63
	Mid.	·04	52	46		Mid.	·38	60	52
9	Noon	30·15	60	49	5	Noon	30·28	60	58
	Mid.	·15	56	45		Mid.	·04	57	54
10	Noon	30·18	58	48	6	Noon	30·22	54	54
	Mid.	·12	52	44		Mid.	·27	56	52
11	Noon	30·30	58	52	7	Noon	30·24	57	57
	Mid.	·42	57	50		Mid.	·34	57	56
12	Noon	30·54	62	58	8	Noon	30·08	62	61
	Mid.	·45	59	51		Mid.	·09	61	57
13	Noon	30·02	69	64	9	Noon	29·98	62	63
	Mid.	·15	63	58		Mid.	·87	66	62
14	Noon	30·14	71	68	10	Noon	30·01	71	67
	Mid.	·06	63	57		Mid.	·03	65	60
15	Noon	30·15	68	67	11	Noon	30·11	62	59
	Mid.	·10	64	59		Mid.	·06	66	59
16	Noon	29·99	60	57	12	Noon	30·12	59	56
	Mid.	·00	59	54		Mid.	·02	60	55
17	Noon	30·10	63	63	13	Noon	30·15	63	59
	Mid.	·02	61	55		Mid.	·18	58	52
18	Noon	30·10	58	59	14	Noon	30·18	64	60
	Mid.	·22	57	57		Mid.	·02	59	54
19	Noon	30·31	62	58	15	Noon	29·99	57	55
	Mid.	·26	60	50½		Mid.	·99	60	57
20	Noon	30·33	64	59	16	Noon	30·13	65	55
	Mid.	·29	60	52		Mid.	·18	61	54
21	Noon	30·18	65	59	17	Noon	30·28	60	60
	Mid.	·05	66	50		Mid.	·15	61	52
22	Noon	30·05	56	55½	18	Noon	30·15	58	58
	Mid.	29·92	55	48		Mid.	·05	60	55
23	Noon	30·15	60	52½	19	Noon	30·25	61	59
	Mid.	·28	54	47		Mid.	·35	58	52
24	Noon	30·50	61	55	20	Noon	30·38	64	58
	Mid.	·51	58	49		Mid.	·23	58	56
25	Noon	30·52	64	56					
	Mid.	·39	59	51					

METEOROLOGICAL OBSERVATIONS taken in BRITISH COLUMBIA during the Months of APRIL and MAY, 1859.

Date.	Barometer and Thermometer attached.				Thermometer.				Remarks, Place, &c.
	6 A.M.	Noon.	5 P.M.	10 P.M.	6 A.M.	Noon.	5 P.M.	10 P.M.	
1859.									
April 20	o o	o o	o o	o o	30.11	65.1	..	..	Weather very fine; at Langley, Fraser River.
21	30.10	67	..	..	..	..	..	..	Fine night; overcast.
22	..	..	..	..	..	..	..	..	Fine.
23	..	..	..	..	..	..	..	..	Drizzle; at Fort Hope.
24	..	29.54	61	..	29.71	68	..	54	Drizzle; force of wind 4-6.
25	29.86	51	29.92	54	29.97	64	51.1	..	Cloudy; slight showers, &c.
26	..	29.97	56	29.97	57	..	54.1	54	Cloudy.
27	29.79	50	29.75	56	29.78	57	..	58	Drizzle.
28	29.83	53	29.83	51	29.85	56	45	50	Drizzle; slight showers.
29	29.57	43	29.50	50	29.53	53	45	50	Very fine.
30	29.57	54	29.61	63	..	..	45	50	Cloudy; Fort Yale, F. R.
May									
1	29.51	51	29.52	61	..	..	..	..	Fine; at Fort Yale.
2	..	..	29.50	58	..	..	..	..	Very fine.
3	29.47	40	29.47	81	..	40	85	50	Drizzle; at Ferryhouse, F. R.
4	29.65	54	29.76	62	29.72	61	63	61	Drizzle; passing along river.
5	29.72	47	29.30	63	29.08	73	61	60	Drizzle; Therm. in sun 84°; at Boston Bar.
6	28.87	51	29.47	77	29.13	74	45	73	Drizzle; ditto 80°.
7	29.02	51.1	..	..	28.78	57	50	..	Drizzle; force of wind 3-5.
8	28.47	51	..	..	..	..	50	64	Drizzle ditto.
9	29.02	44	29.07	54	29.21	61	40	61	Fine; Lytton, F. R.
10	29.11	44	28.50	64	27.72	50	43	64	Drizzle ditto.
11	27.75	48	28.04	65	27.85	60	30	65	Weather fine; passing along the Nicola River.
12	27.92	43	27.97	64	27.42	60	42	70	Drizzle.
13	27.80	41	27.40	65	26.25	70	50	79	Drizzle; on top of Skytawk-hill, near Fort Thompson.
14	26.60	40	28.02	72	28.58	66	32	72	Drizzle; at Fort Kamloop or Thompson.
15	28.38	40	28.53	80	28.44	68.1	40	76	Drizzle.
16	28.28	69	28.20	73	28.35	62	45	70	Drizzle.
17	28.06	65	27.69	72	27.62	72	65	73	Drizzle; at Lake Shuswap.
18	28.41	58	28.44	77	28.11	63	48	62	Drizzle; therm. in sun 127° at noon.
19	28.17	39	27.61	69	27.10	67	34	60	Drizzle.
20	27.13	39	27.71	73	28.46	73	48	60	Drizzle.
21	28.21	58	28.17	73	28.17	70	60	81	Drizzle; force of wind 4-6.
22	28.14	53	28.06	71	28.00	65	51	75	Drizzle; slight showers, &c.
23	28.09	49	28.70	67	28.60	63	40	68	Cloudy; slight showers, &c.
24	29.49	53	29.64	67	29.43	72	62	70	Very fine.
25	29.54	55	29.52	60	29.45	60	55	80	Therm. in sun 90°.
26	29.17	55	29.02	70	28.24	67	55	70	Passing along the Harrison and Lillooet Trail.
27	28.00	51	29.00	72	28.90	63	50	72	A.M., fine; p.m., very rainy.
28	28.83	66	28.88	62	29.21	57	56	65	Cloudy; slight showers.
29	29.28	53	29.42	60	29.77	59	53	60	Drizzle ditto.
30	..	29.67	56	..	29.74	58	53	60	Heavy squalls of rain; at Fort Douglas.
31	29.21	40	30.12	50	30.31	53	40	60	Fine; at Harrison Lake.

At Pavilion,
Fraser River.

XVII.—*Report on the Harrison and Lilloet Route, from the Junction of the Fraser and Harrison rivers to the Junction of the Fraser and Kayosch rivers, with Notes on the Country beyond, as far as Fountain.* By LIEUTENANT H. SPENCER PALMER, R. E.

Communicated by the ADMIRALTY.

Read, December 12, 1859.

Lieut. PALMER to Col. R. S. MOODY, R.M., F.R.G.S., &c.

SIR,

May, 1859.

As the existing route from Queenborough to Douglas can be performed throughout by steamers at certain seasons of the year, I deem it unnecessary to describe it in detail, dwelling only on those points where engineering works will be necessary to establish it as a permanent route for river steamers at all times.

The Harrison River runs into the Fraser from the northward, at about 35 miles by water above Fort Langley. At the mouth the river is broad and deep, and the current by no means swift, the water of the Harrison being backed up by that of the Fraser at this season of the year. About 3 miles, however, from the mouth it is extremely shallow and rapid, and although a channel does exist, which will admit of bateaux drawing 1 foot or 18 inches of water being towed through at the lowest stages of the water, it is a great deal too tortuous, narrow, and shallow, to admit of the passage of steamers of the class at present running on the Fraser, except at high stages of the water.

To render this route permanent it will be necessary to form a channel through these shallows of a considerable width (say 40 feet), which shall maintain a depth of at least 3 feet at all times.

At the time I made my reconnaissance the water was too high to admit of my forming any decisive opinion as to the works necessary for the above purpose; but from such information as I have been able to collect, in addition to what I observed myself, the portion that would have to be deepened is not more than a quarter of a mile in length.

I am of opinion that the simplest and easiest way to effect the formation of this channel would be by draining at the upper end of the shallows, an operation that would be greatly facilitated by the existence of the numerous small islands and bars with which this portion of the river is studded, and which, although covered at high-water, are perfectly dry in the fall of the year.

The damming might be effected in two ways: either, 1stly, so as to close the heads of the numerous slews and creeks through which the water at present runs, and thus drive it into one main channel; or, 2ndly, the water might be forced through a narrow channel by the construction of wing dams at such points as might be necessary.

The actual method to be employed can only be decided on by inspection at low-water; but, as the river at this part is from 500 to 600 yards wide, I am of opinion that the forcing of so large a body of water through a comparatively narrow aperture would have the effect of deepening the channel to the necessary extent without any excavation whatever. From this point to the head of Harrison Lake, a distance by water of 40 miles, no obstruction whatever exists to the navigation. The lake, which is 34 miles in length, is bounded on either side by cliffs so rocky and precipitous in most places, as almost to preclude the possibility of constructing a road along its margin; and the formation of a channel through the shallows of the Harrison River will, in conse-

quence, be necessary as a preliminary step to ensure constant communication with Douglas.

A short narrow creek, about half a mile in length, connects the north corner of Harrison Lake with a smaller one, called at present "Lake Douglas," about $1\frac{1}{4}$ mile in length and $\frac{3}{4}$ mile extreme breadth.

At the lower end of Douglas is a flat, shallow, gravelly bar; on which, although in summer time there is sufficient water to allow of the passage of steamers, there are not above five or six inches in winter.

There is also an extremely sharp bend in the creek, just below the bar, which is with great difficulty rounded by steamers, even at the highest stage of the water, and which at low-water, when the creek is not more than one-third of its present breadth, would, in my opinion, be impassable. I also think that the nature of the soil is such that, even if a passage were cut through the bar, there would be every probability of a fresh deposit taking place, owing to the sharp bend immediately below; and coupling this opinion with that above expressed, relative to the difficulty of turning the bend, I conclude that to ensure a constant steam-communication with Douglas, it would be necessary to cut a new and straight channel, connecting Lakes Harrison and Douglas.

The town of Douglas is situated at the head of the lake, on ground which descends to the water at a considerable slope and rises in rear of the town to a height of about 300 feet. This ground is a gully between two mountains, portions of chains which extend down either shore of the lake.

The town site is heavily timbered, with little or no land in its immediate vicinity which could be made use of for agricultural purposes.

Adding to these defects the fact of its being embosomed in hills, which render this mode of egress to the interior by roads extremely difficult, and the insufficient depth of Douglas Creek, I deem it a very badly chosen spot for a town, and a poor terminus to what is likely to form the main head of communication with the Upper Fraser.

The "Lilloet Trail" starts from the western end of Douglas, and, keeping to the left of the bed of the gully, ascends to a very considerable height (say 500 feet) on the side of the westernmost of the two mountains.

This portion of the trail is extremely bad.

The line of route that has been adopted is by no means the easiest that the nature of the country affords; and, although a considerable ascent is unavoidable, I think that by adopting a line of route which I shall presently describe, it need not rise to much more than half its present elevation. The bridges and corduroys are indifferent, and the road stony throughout, and in many places swampy for the want of small culverts and drains.

Few or no attempts have been made at regular grading, and the present trail rises in several places over spurs in the hill at grades impassable for any animals but mules, and barely so for them, descending as precipitously on the opposite side.

At about 2 miles from Douglas the trail reaches its greatest elevation.

It is then carried along on comparatively level ground for about half a mile, when turning sharp to the right it descends a steep hill to the bed of the ravine.

Crossing the ravine, at a considerable elevation, it is carried along the slope of the opposite mountain for a short distance, and then descends very precipitously by a zigzag path to a strong plateau about 140 feet above the level of the Lilloet River, running along this plateau for about half a mile by the side of the river till it reaches the Four-mile House.

In constructing a waggon-road on this portion of the route I would suggest as follows:—

It being almost impossible, from the nature of the ravine in the immediate

vicinity of Douglas, to carry the road along its bed, I would recommend that the existing line be adhered to for the first 900 yards, subject of course to such alterations regarding the precise spot of exit from the town as might be thought fit, and with any slight deviations that might improve the regularity of the grade.

On arriving at the first confluence (600 yards from Douglas) I would keep to the right along the ravine, which at this point is on the same level as the trail, thereby avoiding an ascent of 200 or 300 feet.

A road might easily be constructed along this ravine for upwards of 2 miles, subject to no great variation in level, and, meeting the old trail at the crossing point, be continued on approximately the same line as far as the top of the steep descent to the plateau.

This hill is unavoidable, and can only be made practicable for loaded waggons by long grading through stony and rocky ground, at a very considerable expense.

On the "Stony Plateau" the trail winds most unnecessarily, and the construction of a straight waggon-road would be a matter of no difficulty whatever.

On leaving the Four-mile House the trail is generally pretty good, though a much better and straighter line of road might be adopted by keeping along the river-bank.

At about 1 mile from the house it leaves the river to the left, and mounts an extremely steep and stony hill at a grade at present almost impracticable for waggons. The ascent continues for about a mile, the descent to the river on the other side of the hill being equally as steep and precipitous as the ascent.

Rejoining the river about 3 miles from the house, and following it for about 300 yards, the trail again bends to the right and ascends a second hill longer than and equally as steep as the former one, descending to the plateau on which the Ten-mile House is situated, at an average angle of about 30° with the horizon.

On this portion of the route the same general defects exist as on the first part, viz. :—

A bad line of trail both in general direction and in detail. Precipitous ascents and descents; indifferent bridges and corduroys; a stony and irregular trail.

I would suggest the following changes in the route, my opinion being formed from an inspection of the places in question :—

The road, after leaving the Four-mile House, should be carried along the river-bank as far as the foot of the first hill, then, instead of bending away from the river, it should follow it round the base of the hill, meeting the present trail where it rejoins the Lilloet.

In this portion of the proposed new route there are two bad rocky places, each about 200 yards in extent, caused by spurs from the hill running down to the river, where a good deal of cutting and blasting would be necessary; but, as the remainder of the route is good for a road, I think this line would be far preferable to that over the mountain, which could not be made practicable for waggons except at an immense expense.

Where the old trail strikes the river again the two routes might coincide for 300 or 400 yards, and then, instead of mounting the second hill, I would adopt the same plan as before and follow the river round.

The road here, after going along an easy level plateau, for about 1 mile, would strike a small tract where a number of successive spurs tolerably level on the top, but with ravines between them, run down to the river in a southerly direction. The difficulty might, however, be overcome by careful grading round the heads of the ravines.

This formation continues for about one-third of a mile, after which the road would emerge upon a broad and beautifully level plateau, with little or no brushwood, and very light timber, much of which has been burnt.

This flat, which I have named in my plan the "Burnt Plateau," is about 1 mile in extent, and a good road along it might, I think, be made in two days by a party of 50 or 60 men. On arriving at the end of the Burnt Plateau I came to the "Glens" of the Lilloet River, and found that it would be absolutely impossible to continue the road along the bank, as the cliffs here run down to the water at a considerable angle with the horizon, and the huge boulders and fragments of rock which lie about, and the danger that would be incurred from future slides in the cliff, preclude the possibility of so doing.

If, however, the road be inclined to the right corner of the Burnt Plateau, it can be carried up at a tolerable grade to another plateau, between the river and the existing line of trail, but on a much lower elevation than the latter.

By following this route the additional advantage of an easy descent to the Ten-mile House plateau would be gained—a point of great importance, as the existing descent is barely practicable.

For the first half-mile, after leaving the Ten-mile House, the trail is very irregular. Several small ravines extend across the line of route to the river, and to diminish the steepness of the ascents and descents the trail is carried round the heads of the ravines. It also winds most unnecessarily on the level ground between them. Should a waggon-road be made here I would recommend that it be cut straight through; there is plenty of timber at hand, and bridges of from 40 to 60 feet span might be built across the ravines, which are only four in number.

After the first half-mile a cutting in the side of the hill (which is, I think, unnecessary, there being a fine flat below) leads to a Cedar Bottom magnificently timbered. I cannot speak positively as to the advisability of carrying the road along the flat mentioned above, as although it was dry when I was there, the water of the Lilloet may have risen since sufficiently high to swamp it.

The Cedar Bottom is a little swampy in two or three places; this, however, is caused not by the Lilloet River, but by small streams running down from the mountains, which frequently overflow and leave their natural beds, owing to obstructions caused by fallen logs, &c. This evil might be remedied by clearing proper channels for the rivulets, but I would suggest that a waggon-road should keep to the right on a higher line of level than the existing trail.

In the Cedar Bottom, which is about three-quarters of a mile long, and of an average breadth of 500 yards, the soil is very rich, but there is so much timber that I question its availability for agricultural purposes. At 14 miles from the Ten-mile House the trail ascends a short steep hill by a zigzag path, and is carried along the side of a small mountain for about half a mile on undulating ground, rising with one more steep ascent to the top of a level, well-timbered and strong plateau on a spur from the mountain.

The hills, I fear, cannot be avoided, as the banks run down steep to the very edge of the river. At 3 miles from the Ten-mile House it runs down the hill, on the opposite side of the spur, and crosses a broad ravine, extending from the river to the mountains, and consequently unavoidable.

Crossing the ravine it rises with a long ascent of 1 mile, varying in steepness to a plateau on the summit of another spur. It is continued for half a mile along this plateau, and then descends a hill dreadfully stony, and so steep that it has been necessary, in portions, to zigzag the path to make it practicable for mules.*

* On arriving at the foot of this hill, a level stony plateau, one mile long, leads to the Sixteen-mile House, situated about 300 yards back from the river.

A waggon-road, if constructed, should be carried down the side of the first spur at a long and gentle grade, and, having crossed the ravine, should, instead of mounting the hill on the opposite side, be carried round the foot of the hill, by the river, on a much lower plateau than that on which the present route runs.

Circumstances prevented my actually walking over the ground in question, but from what I saw myself, and the information I collected, I think there would be no difficulty in adopting this line for the road.

Immediately on leaving the Sixteen-mile House the River "Aechuchlah" is crossed by a good substantial log-bridge of 45 feet span. A short rise then leads to the top of a fine plateau, about 30 feet above the level of the Lilloet River.

The trail is carried along the plateau at distances from the river, varying from 150 to 400 yards, and there would be no difficulty in constructing a good waggon-road on a much straighter line than the existing trail.

The plateau is $2\frac{1}{2}$ miles long, and of an average breadth of 500 yards.

Timber abounds, chiefly hemlock-pine, and the soil, though stony in some places, is generally good for cultivation.

At the end of the plateau the trail descends a short hill to nearly the level of the river, and runs close to the water's edge for a short distance. I here passed a beautiful little patch of land about 3 acres in extent, abounding with roses and wild fruit, and which, if cleared, might easily be turned to some use. On the opposite side of the Lilloet is a large Indian wigwam and fishing-station, with a little clear land and some potato-patches around it. The trail now, for nearly a quarter of a mile, is cut in the side of a stony hill which runs into the water; but as this hill is subject to frequent slides, which would render it a matter of considerable expense to keep a road thus out in repair, I would suggest that a sea-wall of stones be built 5 or 6 feet out in the river (which is here very shallow), and a road made on the top.

There are plenty of large stones at hand for this purpose, and I think it would be easier, cheaper, and generally more advantageous to construct a road in this manner than to make a regular cutting in the side of the hill.

After passing this hill I came to a long point which juts out to the left into the river, and at the extremity of which, 200 yards from the trail, are the Great Falls of the Lilloet.

The trail crosses this point on a good general line, and rejoins the river about half a mile further up; it then follows the bank at distances varying from 5 to 100 yards from the river, and about 15 feet above it, on a fine level plateau three-quarters of a mile long and 500 yards wide, with good rich soil, scanty timber, and little or no brushwood.

At the end of this plateau there is a very steep rise (zigzagged) to a ledge on a high clay-slate hill. The trail is carried along the side of this hill for about 200 yards, and then descends precipitously to the foot, whence a quarter of a mile tolerably level, but capable of great improvement, leads to the Hot-spring House.

This hill might be entirely avoided and a good road constructed round its foot, with the aid of a little blasting.

On leaving the "Hot-spring House" the trail runs for one mile along a fine broad flat, about 10 feet above the level of the Lilloet, following the bank for half a mile, and then leaving the river, which takes a bend to the left.

This flat is rather rocky and the soil light and sandy.

Hemlock and cedar abound, and there is very little underwood.

At the end of this mile the trail branches to the right and ascends a gorge between the mountain on the right and a high rocky bluff (named in my plan "Moody's Look-out") on the left. After reaching its highest elevation (about 250 feet), it runs on a comparatively level line along the top of the hill for about a quarter of a mile, and then descends along a steep hill to the

river bank. This hill should be avoided, if a waggon-road be made, by deviating to the left at the foot and following round the base. The ground is level and good throughout the greater part of the distance; the difficulties to be overcome being about 100 yards of rocky ground, succeeded by a piece 20 yards long, where the bluff rock runs nearly perpendicularly into the river. The first of these difficulties might be mastered by blasting; the second, by the construction of a sea-wall of the description proposed at the Great Falls. Immediately after getting round the point the road would strike a fine level flat, continued to the point where the present one trails the Lilloet.

For the next mile the construction of a road is simple enough, and it might be made much straighter than the existing trail; a little careful grading would be necessary to descend into a rise from the valley of the River "Schotscheen," which runs too far back to be rounded, and is too broad to be bridged. This river is about 50 feet wide, and is crossed by a good bridge of 60 feet span. Another mile and a half of very good level trail along a plateau by the river-bank, varying in breadth from 150 to 300 yards, leads to a spot marked in my plan as "Camp," close to the foot of a long range of steep hills. The land thus far is all more or less good for cultivation, timber being rather scanty, and little or no brushwood. The soil is rather light and strong, but is, I think, available for agriculture.

From the Camp it is exactly 6 miles by the trail to the house at the southern end of "Tenass Lake," known as the "Twentyeight-mile House," although in reality 34 miles by the trail from Port Douglas.

The mountains throughout the whole 6 miles run down to the water's edge, and the construction of a waggon-road along their sides would be a matter of great difficulty, labour, and expense. There is no plateau whatever along which the road could be carried, and no possibility of avoiding to any extent the steep ascents and descents to which the present trail is subject.

I think it, therefore, not only highly advisable, but positively necessary to cross the Lilloet River in the neighbourhood of the Camp. I examined the river for the purpose of finding the best crossing-place, and think that the most suitable spot is about 300 yards beyond the Camp.

Mr. Nicol, J. P., was kind enough, on a subsequent occasion, to walk down on the opposite side the whole way from the Lake to the Camp, and informs me that there is an excellent Indian trail along the river-bank, easily convertible into a good level waggon-road. The only obstructions are the rivers "Broockwa," and another with two mouths, called in my plan "Delta B," both of which would have to be crossed by bridges of 50 or 60 feet span. There is, in addition to the above, one rocky place to be passed, but this would be no great impediment to the construction of the road. I have since had an opportunity (while I was descending the Lilloet in a canoe on my return) of examining portions of this part of the proposed new route; and am of opinion that it would be advisable in more ways than one, as, in addition to the advantage of having a level waggon-road, there is a great deal of good agricultural land in the neighbourhood, which would thus be opened up for cultivation.

The trail is at present continued beyond the Twentyeight-mile House, as far as the southern end of Lake Lilloet, a distance of 8 miles.

I propose, however, by a method I shall presently describe, that the south end of Tenass Lake be made the terminus of the first portage, eight miles of land-transport over anything but a good road being thereby avoided.

There is an excellent site for a town at the terminus of the new route I have proposed, and as a small one would be very likely to spring up at the junction of the land and water communications; this would be a farther inducement to

its adoption, there being no sort of site for a town at the terminus of the present trail.

Lakes Lilloet and Tenass are connected by a small river about $1\frac{1}{2}$ mile in length, rapid, and towards the mouth very shallow. The difference of level between the lakes I ascertained to be 10 feet $6\frac{1}{4}$ inches on the 23rd May, 1859.

By constructing a dam of the necessary height across the Lilloet River, where it leaves Tenass Lake, the water in the two lakes might be brought to the same level, and a permanent water-communication thus established. This damming would have the effect of swamping portions of the flat land in the neighbourhood of the Tenass River, but that at the terminus of the proposed route is too high to suffer in like manner.

The dam might easily be constructed of logs, snags, and stones, plenty of which are at hand.

Possibly a permanent water-communication between the two lakes might be effected by deepening the Tenass River at and near its mouth. As, however, I was not on the ground at the lowest stage of the water I cannot speak as to the extent of the portion that would have to be deepened; but, from such information as I could collect, it would only be necessary to form a channel at and near its mouth.

On this part there are, I am told, but six inches of water in winter time, the remainder of the river quite deep enough to admit at all times of the passage of steamers of the small class likely to be established on the lakes.

Thus far I have described such deviations from the existing line of trail as would be required, supposing it absolutely necessary to construct a waggon-road on the left bank of the Lilloet from Douglas as far as the Camp.

I am, however, of opinion that the site of Douglas is extremely badly chosen.

In addition to the defects I have already pointed out I am informed by the Indians that Lake Douglas freezes in the winter, and remains so for some time, while the Harrison never freezes at all.

In the north-west corner of the latter lake there is a high dry site for a town, accessible at all times to boats and steamers, and open to the valley of the Lilloet River. As a protection from the sea, which is sometimes rather rough for boats, a breakwater of snags might easily be constructed at the point shown in the plan, to form a small harbour, behind which they might lie in safety. By making this the terminus of the route a constant steam-communication with Queenborough could be established (the channel once open to the Rapids of the Harrison River), and there would be this additional advantage, viz., that the flat land in the valley of the Lilloet would become opened up for cultivation.

From the cursory view I was enabled to take of the right bank of the river during my rapid descent in a canoe, I am of opinion that from the Harrison Lake to the point opposite the plateau, below the Sixteen-mile House, a road could be far more easily made along that bank than on the present route.

Not having actually walked over every portion of the ground, I cannot speak very decidedly on this point, but adding to the opinion I was enabled to form the fact, that the old Indian trail runs along the right bank the whole way from the Harrison Lake to the Tenass Lake, and the well-known circumstances that the Indian trails throughout North America invariably follow the best line of travel through a wild country, I conclude that at least a great portion of the road should be carried along that bank.

I have accordingly come to the following opinions on this point, viz.:—

“That the starting point of the route should be changed from Douglas to

the north-west corner of the Harrison Lake. That the waggon-road be carried along the right bank of the Lilloet River, as far, if possible, as the point opposite the lower end of the plateau, below the Sixteen-mile House.*

"That the River be bridged here, and the road carried along the left bank as far as 'The Camp,' following the general direction of the present trail, subject of course to the deviation already proposed.

"That the Lilloet be recrossed at the point marked on the plan, and the road then constructed on the right bank of the river, and terminated at the southern end of the 'Tennas Lake.'"

I may here mention that Sapper Breakenridge, who has since made a reconnaissance of the right bank from the Harrison Lake, as far as the point opposite the Four-mile House, reported to me, after going over both routes, that the one on the right bank, although rather swampy in some places, was far preferable to the existing one, and I think a still better might be found by keeping further back from the river.

The distance by water from the south end of the Tennas Lake to the north-west end of Lake Lilloet is about 21 miles, the shores of both lakes being equally as precipitous as those of the Harrison.

The town of "Pemberton," which, when I was there, consisted of five or six houses, stands on a wretched rocky site in the northernmost corner of Lake Lilloet. At high stages of the water the town is accessible to boats, but in the winter a long flat bar of sand prevents their coming within 500 yards of it. From this place the second portage commences, known now as the "Birkenhead Portage;" nor is there any better starting point in the vicinity.

The valley of the "Upper Lilloet," which river runs into the lake at its western extremity, takes a westerly direction from the head of the lake. The river, about 5 miles from its mouth, divides into two, a large delta being left between the mouths, which, in summer time, is again divided in two by a creek. On this delta, and particularly towards its western point, a few farming-men have cultivated land, and there is also a large Indian village, surrounded by potato-patches, &c. In the centre of each island is a small lake, the ground, for a considerable distance from their edges, is swampy; but the banks are high and dry all the way round, contain good soil, and are covered with magnificent grass. The trail, on leaving Port Pemberton, is carried over ground very similar to that at the back of Douglas, but in this case the ravine has been adhered to, and the hills are far less precipitous than those near Douglas. I was unavoidably compelled, both on my way up and on my return, to travel very rapidly over this portage, and consequently unable to make detailed field-notes, or survey the route as accurately as I should have wished. The trail which, for the whole 24 miles, runs through a natural pass in the Cascade Range, is, on the whole, far better than that on the Douglas Portage, and, with the exception of blasting round two or three rocky hills, no great deviation from the present route would be necessary, *if Port Pemberton be made the point of departure.*

As, however, it might be necessary, in the event of this route being made the main channel of communication with the upper country, to establish a town of some size at the junction of the land or water communications, the site of Port Pemberton should, in this case, be abandoned.

There is a good site for a town, near the mouth of the "Mosquito River," which empties itself into the Upper Lilloet, opposite the Indian village, on the westernmost of the Lilloet Islands. If, therefore, the bar at the mouth of the southern or main branch of the river were deepened sufficiently to admit at

* If impossible to carry it as far as the point proposed, there are several good crossing-places along the river (one half a mile below the Four-mile House), but the Port Douglas Hill should by all means be avoided.

all times of the passage of steamers, I would suggest that the town be established at the mouth of the Mosquito River, and the road run along the valley, striking the old trail at its junction with that river. The large valley of the Upper Lilloet would thus be opened up and inducement given to farmers to clear and cultivate the land in the vicinity of this town, which might otherwise be neglected in consequence of its remoteness from any main route of communication.

About 17 miles from Pemberton the trail runs along the shore of a small lake, one mile long and half a mile broad.

This lake, which is situated on the summit of the Pass, is called "Summit Lake," and from either end there is a descent to the Fraser, that from the north by Anderson River, through Lakes Anderson and Seaton, and the River Imkunitch, and that from the south end by the Mosquito River, through the Lilloet and Harrison Lakes.

After passing the Summit Lake I crossed a tract of valley land 2 or 3 miles in extent, containing little timber, and good rich loamy soil, irrigable, if necessary, from Anderson River.

In the vicinity of Anderson, and for some little distance down the eastern shore of the lake, there is plenty of good grazing-land for sheep and cattle on the sides of the mountains; and I am informed that, owing to the absence of briars, &c., this part of the country is very well adapted for raising good wool.

The town of Anderson is situated, as shown in the plan, on the south-western end of Lake Anderson.

The site, as regards its suitability both for a town and a point of departure for steamers, is extremely good.

The bank is high and dry (about 15 feet above high-water mark), timber plenty and fine, but not too much of it, the soil good, and the land for one mile in rear flat, and easily irrigable. A good jetty has been built by the men who have settled there and own the boats that convey passengers across the lake, and, as the water is deep close in-shore, the port is accessible at all times to steamers.

From Anderson to the spot marked in my plan as "Wapping," which consists of one log-house for travellers to sleep in, is 14 miles by water.

The short portage connecting lakes Anderson and Seaton (1½ mile in length) commences here, and terminates at the spot marked "Flushing."

A Mr. Dozier, an American, who has established a waggon for conveying provisions across this portage, constructed a waggon-road last year, connecting the two lakes, entirely at his own expense.

The road is a very fair one, and as he has likewise constructed a neat and substantial bridge across the Seaton River of 60 feet span, I would suggest that, in the event of this becoming a permanent route, the by no means trivial service he has done to the colony be recognised.

It will be seen, on looking at the plan, that it is necessary to cross the river, as there is no starting-place for boats or room for houses, on the right bank, at the Lake Seaton end.

The land on this portage is stony, the timber is scanty, but the brushwood thick, and there is a fine patch of rich land to the north-west of Flushing. Both that place and Wapping are admirably adapted for the points of departure of steamers and as sites for small towns.

On the 30th of May I found the difference of level between the two lakes to be 594 feet, a difference which would combine with the softness of the soil to render the construction of a canal of communication a matter of considerable difficulty. Several locks would, moreover, be necessary, and I question whether it would not be better to run the goods across the Isthmus on a tramway, which might easily be made from one jetty to the other.

At the eastern end of Lake Seaton, 14 miles by water from Flushing, is

situated the small town of "Seaton." The houses are built on the beach, which is not more than 30 or 40 yards broad in the widest places; and immediately in their rear a steep bank, about 100 feet high, leads to a large diamond-shaped plateau or bench, on which there is good grazing-land for cattle (bunch-grass) and very little timber. The site of Seaton possesses the same advantages, as a point of arrival and departure for steamers, as the other places on these lakes, but there is no room to establish a town except on the top of the bench, which would, I think, be too far above the water.

The trail winds round the point of the plateau at a steep rise, and, on attaining a height of about 50 feet, is carried along the side of the hill at an undulating level for about half a mile.

Here it emerges on a level and very stony plateau about one-third of a mile broad, bounded on the north by the Inkumteh, and on the south by the Kayosch River. These rivers join in one, about three-quarters of a mile further on, and the trail is carried along the plateau to within 100 yards of this point.

It then crosses the Inkumteh on a rough log-bridge, built last May by the packers, between Seaton and Kayosch. A large rock in the bed of the river forms a natural pier for the support of the centre of the bridge.

For the next three-quarters of a mile the trail runs along the side of a stony mountain at a considerable elevation, on a small ledge cut for the purpose. This portion of the route is very dangerous, and, owing to the frequency of large slides in the mountain side, impassable for a waggon-road.

Passing round the point of this mountain the trail emerges on the level grassy bench-land, peculiar to this district of the Fraser, and, running along this land for about $1\frac{1}{2}$ mile at a very slight variation in level, reaches the small town of Kayosch, situated on the western bank of that river.

The benches in the vicinity of this portion of the Fraser, which are covered with bunch-grass, and in some places scantily timbered, would form excellent grazing-lands for cattle, but the soil is, I think, too dry to be cultivated to any extent. There are two or three small rivulets running through the bench on which the town of Kayosch is situated, which afford a supply sufficient for the wants of the present inhabitants, and for irrigating a small patch of about 10 acres on a lower bench in front of the town, now under cultivation, and I dare say more might be obtained by digging wells; but water to any great extent is not to be had on the upper benches, either on the Kayosch or on the Fort Behrens side of the Fraser.

The majority of the benches, although beautifully clear and level, are, I think, at too great an elevation above the Fraser River to be well adapted as sites for towns; that, for instance, on which Kayosch stands being about 150 to 200 feet above the river.

They vary in length from $\frac{1}{2}$ a mile to $1\frac{1}{2}$ mile, and in breadth from 200 to 1000 yards; the slopes connecting one bench with that above it being generally at an angle of about 45° .

I was unable to procure any means of crossing to the southern bank of the Kayosch, but I was able to see sufficient from the opposite side to convince me that on that bank, at its junction with the Fraser, is the best site for a town in the neighbourhood.

June 1st.—At this part a considerable flat, 300 or 400 yards wide, and about 20 feet above the level of the Fraser, extends some distance down the shore of the Fraser and up the Kayosch.

Behind this flat, and about 100 feet above it, is another extensive plateau to which a town might be extended, while any amount of water-power might be obtained in that portion of the town or the lower flat, by fluming from the Kayosch.

I suggest, therefore, that instead of crossing the Imkutitch at the forks of that river and the Kayosch, the latter river be bridged at or near the same point, whence an almost natural waggon-road extends to the proposed town site on the right bank, a distance of 125 miles.

The trail from Kayosch to the bank above French Bar requires no alteration whatever, extending along the flat benches at occasional slight changes in level for about 24 miles. It then runs down a frightfully steep bank to the "Bar," and as the remainder of the route both from this point to the mouth of Bridge River, and thence on to Morman Bar, is so bad as to render the construction of a waggon-road barely possible, I will proceed at once to report on the best route to Fountain that, in my opinion, the nature of the country will permit.

The Kayosch should, I think, be bridged from the south as near its mouth as practicable, the waggon-road carried round near the Fraser at the lowest possible elevation, as far as French Bar.

Crossing the Fraser at a point on the bar which will be found practicable where the river is only about 75 yards wide; * it should ascend the steep bank on the opposite side at a gentle grade, whence, with the exception of one place subject to slides, the road to Fountain is generally good.

Fountain is situated on the left bank of the Fraser, on a large bench upwards of a mile in length, about 500 yards wide, and 700 or 800 feet above the level of the Fraser, to which the bank makes a direct steep descent.

14 miles beyond the fountain a trail branches off to the southward and runs at the back of the range of mountains which skirts the left bank of the Fraser as far as the Forks of the Thompson River. This trail is, I believe, the best and shortest route from the Forks to the upper country; the country between Kayosch and the Thompson affords every facility for the construction of a good waggon-road on the right bank, though the existing one on the left bank is, I understand, very bad for a large portion of the distance.

Water to a considerable amount is procurable at Fountain from a lake 24 miles back in the mountain; but, although a town on the flat might be of some importance in connection with the branch roads to the Forks, Pavillon, and Kayosch, the site is at too great an elevation above the Fraser to admit of the establishment of a town in connection with any traffic that may at a future period take place on that river.

The land around and in the valley leading to the Forks is of the same nature as that around Kayosch, viz. excellent for grazing, but too dry in summer, unless well irrigated, to admit of agriculture to any important extent.

In the Bonaparte Valley, which extends from Pavillon to Fort Thompson, there are, I understand, from 40 to 50 square miles of rich land fit for cultivation. In this valley, too, there is a great deal of black marble, and limestones abound at Pavillon and its neighbourhood. With regard to Fountain I should add that a town there might, at a future period, be of importance in connection with a road from Canada through the Bonaparte Valley to Kayosch.

With reference to other interesting features on the route I would beg to call your attention to the following:—

At the south end of Harrison Lake, about three-quarters of a mile to the south-east of the point where the river and lake join, a hot spring, called "St. Alice's Well," is situated.

* There is a rock about one-third of the way across, covered at high-water, but dry in the fall. On this rock a pier might easily be made.

The water, whose temperature on the 20th. May, was 130° Fah., bubbles out of a small mass of conglomerate rock 6 inches above the then level of the lake.

It is highly sulphurous, but, owing to my having been unable to procure a perfectly clean bottle and cork, the specimen I sent down to Victoria proves, I regret, to be unfit for further analysis.

Another hot spring, somewhat similar to St. Alice's, and of about the same temperature, though not so highly sulphurous, is situated about 60 yards north-east of the Hot-spring House, 23½ miles by the trail from Douglas. By a subsequent cursory examination, this water was found to contain chloride of sodium and sulphate of soda; but, owing to the impossibility of my procuring a perfect specimen, an accurate analysis could not be made.

Every sensible miner to whom I spoke on the subject, clearly admitted the existence of gold all along the banks of the Upper Fraser in considerable quantities; in quantities, too, that—were it not for the exorbitantly high prices of provisions and the want of good fresh meat and vegetables—would attract and retain thousands of miners who were then leaving the country. The great cry is for a waggon-road and cheap and good provisions, and these, once obtained, there will be no farther doubt as to the stay of the miners in the country.

Dry diggings have yet to be found, and, there is no doubt, will be found as soon as men have heart and strength to prospect the country in every direction; but as long as bacon and beans are the sole articles of diet, few, if any, will be found with the heart or strength to do more than support themselves by mining for a few hours each day, much less to travel over such a wild country and such bad trails, as they must do, in order to explore the districts in the vicinity of the Upper Fraser.

From the cursory view I was enabled to take of the general geological character of the country, Trappean rocks appear to prevail, consisting principally of greenstone, dense clay-slate (here and there presenting a laminated structure), and compact hornblende. The exposed surfaces of the rocks are very generally covered with the white deposit due to the decomposition of felspar, and are occasionally stained red with iron, forming an agreeable contrast in the landscape. Quartz veins permeate the clay-slate in many places, of an average thickness of from 1 to 12 inches; the formation, in fact, would suggest the high probability of metalliferous deposits.

The mountains rise bold, rugged, and abrupt, with occasional benches on their sides, on which are found quantities or worn rounded boulders, principally of coarse-grained granite, occasionally porphyritic. The granite contains golden-coloured and black mica in large quantities. The crystals of felspar in the porphyritic granite are very numerous, but small. The soil appears in many places to have been formed by the decomposition of granite—it being light and sandy, and containing much mica.

Below the soil is very generally found a white compact mass, very hard, and approaching to a conglomerate, containing pebbles of every description in a matrix of decomposed clay-slate. Lime seems wanting even in the conglomerate, and I saw no traces of limestone or sandstone all along the route, though I understand there is plenty of the former at Pavillon.

TABLE showing the Astronomical Positions of important points on the route,
as computed by LIEUT. H. SPENCER PALMER, R.E.

Station at	Latitude North.			Longitude in Time East of Queenborough.		Absolute Longitude West.		
	°	'	"	°	'	°	'	"
Queenborough	49	12	58	..	..	122	53	15
Mouth of Harrison River	0	14	25	3	25.596	0	1	51
South end of Harrison Lake	0	19	0	4	00.688	121	53	4
Douglas	0	45	35	2	46.808	122	11	33
Ten-Mile House	0	52	41	2	12.972	0	20	3
South end of Tenass Lake	50	3	0	1	10.445	0	35	38
Lilloet Lake	0	7	52	1	9.546	0	35	52
Pemberton	0	17	32	0	40.240	0	43	11
Anderson	0	32	13	1	11.872	0	35	17
Flushing	0	42	25	2	2.356	0	26	39
Seaton	0	40	18	3	10.146	0	5	43
Kayoseh	0	41	51	3	22.753	0	2	33
Mouth of Bridge River	0	45	33	3	17.753	0	3	48
Fountain	0	44	44	3	27.508	0	1	22

TABLE OF DISTANCES.

From	To	Distances by Land (trail) in Miles.	Distance by Water in Miles.
Queenborough Camp	Fort Langley .. .. .	..	17.000
Ditto	Mouth of Harrison River .. ..	..	47.700
Ditto	South end of Harrison Lake .. ..	..	57.700
Ditto	Douglas .. .. .	..	92.700
Douglas	Four-Mile House	4.047	..
Ditto	Ten-Mile House	11.852	..
Ditto	Sixteen-Mile House	18.911	..
Ditto	Hot-Spring House	23.881	..
Ditto	The Camp	27.999	..
Ditto	South end of Tenass Lake	34.000	..
South end of Tenass Lake ..	Ditto Lilloet Lake .. ..	..	6.650
Ditto	Pemberton .. .. .	..	21.130
Pemberton	Halfway House (2nd portage)	15.000	..
Ditto	Anderson	29.000	..
Anderson	Wapping .. .. .	..	14.000
Wapping	Flushing	1.45	..
Flushing	Seaton .. .. .	..	14.000
Seaton	Kayoseh	3.700	..
Kayoseh	Mouth of Bridge River	4.200	..
Ditto	Point opposite Fountain	6.500	..
Total from Queenborough	To Fountain	74.65	141.83

Entire distance, Queenborough to Fountain, 216.48 miles.

XVIII.—*Journey into the Interior of British Columbia.*

By MATTHEW B. BEGHE, Esq., Justice.

Communicated by the DUKE OF NEWCASTLE, F.R.G.S., H. M. Secretary for the Colonies.

Read, December 12, 1859.

Justice BEGHE to Governor DOUGLAS.

Sir,

Victoria, April 25, 1859.

I have to report to you my return from the circuit which I have just held in British Columbia, as far as the Fountains, to which point I followed nearly the course of the Fraser River. Thence I returned by the Lilloet route and the Harrison River to Langley.

I have already had the honour to report, for your information, the proceedings at Langley, at Fort Hope, and at Fort Yale.

Accompanied by Mr. Nicol, the High Sheriff of British Columbia, and by Mr. Bushby, the Registrar and Assize Clerk, I left Fort Yale on foot on the 28th ult., with an Indian servant, and seven other Indians carrying our tent, blankets, and provisions, for Lytton, on the forks of Thompson River.

Acting on the suggestions of the Chief Commissioner of Land and Works, Mr. Nicol and I made a reconnaissance of the entire road travelled over; the result of which I hope shortly to be able to plot out and place in your Excellency's hands.

There being a considerable quantity of snow on the ground we could not follow the mule-trail, but kept on the right bank of Fraser River until two or three miles below Quayome or Boston Bar. There are one or two restaurants on the road; one at Spuzzum, one at the top of the hill immediately above Yale, one at Quayome, and another about 18 miles from Lytton; but we found it would have been an extreme inconvenience to have been without a tent and without a sufficient supply of provisions for the entire route.

It would even be extremely economical to provide at Fort Yale the whole of the necessary stores to carry round the whole way across the portage between Lake Anderson and Lake Lilloet. Provisions we found to be at unusual prices, flour being 1s. 8d. to 2s. per lb., until we arrived at Lake Lilloet.

The trail between Fort Yale and Quayome, by which we advanced, is by this time, I should think, utterly impassable for any animal, except a man, a goat, or a dog. It might doubtless be very much improved. In many places a very painful and dangerous ascent and descent of 20 minutes, in the whole course of which the traveller depends almost as much on his hands as on his feet, brings the path to within a few yards of the projecting precipice, through which a few pounds of powder would have made an easy way. But it suggested itself as extremely doubtful whether it would be worth while at present to engage in any improvements on this part of the line until the far easier Lilloet route be rendered practicable, as it might for a considerable extent very readily be, for carts.

Between Fort Yale and Quayome there did not appear to be any land, except a few spots here and there of a very few acres in extent, capable of cultivation. But the soil was rich and well fitted for roots, and at Spuzzum accordingly the Indians had considerable potato-patches; but nothing like an English farm could be established.

Above Quayome the trail to Lytton presents no serious obstacles to prevent a cart-road being made except in two places. The country above Quayome

changes its aspect very much. There are almost immediately found benches of fertile land comparatively free from underwood, but tolerably thickly wooded with large trees; not more than convenient, however, for farming purposes, which in fences, fuel, and log-huts, rapidly consume timber. About half a day's journey below Lytton a considerable enclosure of about 200 acres is made by felled trees; a Frenchman, whose name I did not learn, intending to make a farm there. Very many such might be made.

There are considerable beds of slate opening on the Fraser River, a couple of miles above Quayome, and these make their appearance two or three times before arriving at Lytton. At the place where I observed the first slate-bed there is also apparently a spring highly charged with carbonate of lime; but it does not appear to be abundant, and, as far as I could trace, appeared to flow but from a very little distance above the bank. Leaves and branches of trees were thickly encrusted with a chalky or marly deposit, but were not hardened or petrified. There were also on the beaches of the river often seen limestone boulders, but I did not observe any *in situ*.

There was a great change in the climate after passing the Quayome River, it was much drier, the springs less frequent, the soil sandier, the undergrowth much less dense; and the spruce, hemlock, Douglas, and cedars, which we had carried all the way from the sea, all disappeared by degrees, and were replaced by a pine, very similar to the Scotch fir, but with longer spines. The first place where we noticed this tree we named Scotch-fir Point.

Lytton does not appear a well-chosen site for any town; it is on the higher of two benches, parallel to each other and to the River Fraser, the lower one being the narrowest, both terminating in a very steep descent, as steep as a man can descend without using his hands, to the River Thompson. I should think 300 or 400 feet deep. The upper plateau on which Lytton is placed descends by a similar bank of about 100 feet high to the narrow bench, which again descends by a similar precipitous bank upon the Fraser River. At the south end of the town there is a very deep gully, which runs a considerable way into the mountains on the east of the river. Up this gully a road might be brought from the Fraser; it is, I think, the easiest way, but it would probably be from 1 mile to 1½ mile in length, for carts. There is only one little rill of water to supply the town; it is adequate for the few houses now there, but quite insufficient for a town of any size. Mr. Nicol and I ascended its course, which is an artificial ditch wrought by miners, for about 1½ mile, in order to see whether it was larger at its source, or diminished by percolation, as we had been told that at that distance it was 15 times its bulk below. We found that this was an entire misrepresentation; we fancied, indeed, but sometimes entirely changed our opinion, that the stream above contained somewhat more water. We had no means of gauging the rill. It is probably the fact that some water is lost, which by a careful system of waterproof piping might be available for the supply of the town. But at best it would be no more than a tolerably rapid flow in a channel a foot wide and 4 or 5 inches deep, not much more than in a sluice-head on a single mining-claim.

Waterworks might easily be constructed to any extent upon the Thompson River, which runs swiftly, and in a very clear and abundant stream. From the nature of the soil I do not think wells would answer. I recollect that when I was on the spot the soil appeared to be more dried up than it now appears. I believe that the appearance was caused, not by aridity, but by severe cold. It is, however, very dry. There is on the right bank of the Fraser, above the Forks about three-quarters of a mile, a much more eligible site for a town—a plateau communicating with the river at a convenient height, and again with many other plateaus of various sizes and of various

heights above it, with abundant water-supply in a large brook which runs strongly behind it, and abundance of wood behind, which at Lytton appears to have been rather scanty at the first, and now is all swept off for log-houses and fires. The only objection to this other site is, that it is a short distance above the mouth of Thompson River, so that travellers up that river would have to go three-quarters of a mile out of their way to visit the town.

The shores of Fraser River were thinly dotted by miners on both sides. The great mass of miners were forcing their way up with provisions in boats. A very few were going up on foot; nearly the same number were returning on foot, alleging the high prices of provisions in the upper country. They were high enough at Lytton, where we were charged 3 dollars a head for each meal, consisting mainly of bacon and hearth-made bread.

It was a great disappointment to us that Captain Travaillot absented himself from Lytton during the whole of our three days' sojourn there. There were many complaints as to the manner in which decisions had been made by him, but in my opinion they did not involve any amount of corruption; but the errors (if any) were such as might reasonably arise from inexperience, and the absence of books or advice. It was a great inconvenience to have no access to any books or plans of the town, which were all locked up. There were a few contested lots, but not many; and I should think the difficulties are not hard to settle.

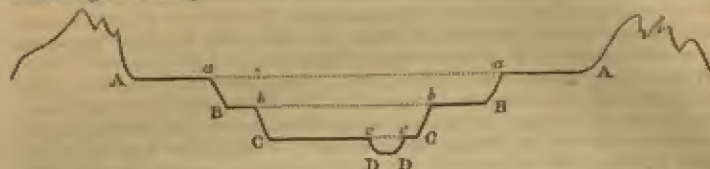
There was a considerable degree of anxiety manifested everywhere for the possession of land; in some instances the mere right to take the crop was not satisfactory, in other it was acquiesced in.

At Lytton considerable excitement was manifested with reference to some ditch regulations, which were then recently promulgated, and which I had not seen until I found them placarded on Captain Travaillot's office door. The miners generally alleged that the quantity of water allowed to a ditch was too small; that in consequence of the lightness of the soil the water in a ditch is lost by percolation; and although calculated by the Government to be sufficient for two sluice-heads, and charged as for two claims, is in fact scarcely enough for one when it reaches the spot worked; and that lumber is so dear and scarce (375 dollars per thousand, in fact not to be had in any quantity) that fluming is impossible. The gold they allege to be very uncertain in its deposit, and that small claims may sometimes be worked out in a day, while others may prove extremely valuable. They allege further, that it is very convenient to have, or to be allowed to have, ditches owned by parties entirely unconnected with the claims, who may sell the water in those ditches without limitation as to price or quantity. They did not seem to object to the limitation to sell only to licensed miners.

As my own view on the theory which I formed of the geological formation of the Valley of the Fraser in this direction is, that the whole valley and benches together are auriferous, and would pay under a large system of water-working, I did not pay great regard to their complaints as to the uncertain nature of the deposits in the claims, which, indeed, I had from practical experience an illustration of. Mr. Nicol and myself washed about 20 pans, and obtained 75 cents' worth of gold. The next 5 pans taken from the same spot yielded 2 dollars, all in rusty scale-gold.

The singular feature of level benches of various breadth, consisting of vast thicknesses of alluvial deposits, loam more or less sandy, and waterworn boulders, gravel, and pebbles, the benches being of various heights one above the other, parallel in their general direction with the course of the river and the mountains between which it runs, and generally matched on either side of the river, forcibly recalls the "parallel mountain roads," as they are called, among the Grampians in Scotland; which are now generally accounted for by geologists on the theory of the whole space between the boundary hill ranges

having been originally a vast lake, and of successive elevations of the earth's surface, a theory to which the neighbourhood of active volcanic ranges appears to me to give much plausibility.



According to this theory,—to which Mr. Nicol and I gave attention in considering the country, and which seemed to explain all the phenomena, and to acquire additional plausibility from the different appearances which we remarked as we proceeded, but a detail of which would be out of place,—A A, along the dotted line, formed at one time the bed of the lake. The earth's surface was locally raised, so that B B stood as high above the level of the sea as A A originally stood. The sudden rush of water swept away by denudation all the portion of the original deposit included between B B, a a. A similar upheaval again occurred, which caused the denudation of the space b, C C, b. A third denudation, c, D D, c, left the water to flow, no longer in a lake, but contracted to the limits of a river, in its present bed D D. It is probable that when so large a lake existed above the Forks, it would arrest, as in a trough,—exactly as is done by the miners' sluicing-trough at the present day, only on a gigantic scale,—all the finer particles of gold brought down by the river from the mountain in the distant upper country. It is probable, therefore, that at the distant geological epoch, when a long lake or a long series of lakes extended for many miles above the Big Cañon—as far as I visited the country, from about Quayama to some miles above the Fountains, a distance of 80 or 90 miles—the banks and bed of the river below these lakes was not auriferous, at all events not so highly auriferous as at the present day. But on the theory that the sediment at the bottom of these lakes was all more or less auriferous, and that vast quantities of the sediment in successive portions were, upon each successive upheaval of the surface, hurried down by the mighty rush of waters through the Cañons, and into and over the smoother country below them, commencing at Fort Yale, we have again an exact repetition of the process witnessed every day in every rocker throughout the country. An enormous quantity of "pay dirt" was at each upheaval cast into the vast sluice of the Fraser.

The scale-gold would be all intercepted in the rough beds of the river as it successively grooved out for itself another and another channel through the ancient bed of the original lake, or at all events in the holes and eddies in the rocks in its passage through the Cañons.

This is the sieve of the rocker, where the scale-gold is—unless the rocker be unevenly worked—always retained. The finer particles, the flour or dust gold as it is called, would be carried over the sieve by the rush of water on to the blanket, and would principally be retained in the first part of the blanket, nearest the sieve. Hill Bar, Prince Albert Flat, and the district generally from Fort Yale to Fort Hope, accordingly, are all impregnated with flour-gold, more or less, and generally more so than the country below, or far below Fort Hope. But the whole of the blanket in a rocker is worth searching, and is accordingly searched by the miner periodically; and we find "flour-gold" accordingly down to Langley. It is a further corroboration of this theory, that while flour-gold does not amount to above 15 per cent. of the gold found at the Forks—85 per cent., or upwards, of the gold found there

being scale-gold—I have never heard of a single scale being found at or below Fort Yale.

If this view be correct, there are therefore in the benches at and around Lytton dry diggings on the most enormous scale. The district which I visited from Quayome to the Fountains is about 70 miles long, and from 1 mile to 5 or 6 miles wide; and in many places 100, 200, and 400, in some even 1000 feet thick. Every spadeful I believe to be auriferous. The bed of the river pays the whole distance from 5 to 100 dollars per hand per day; 12 dollars is not unusual. It is, however, probable that the banks high above the river could not be worked advantageously without the application of copious washing. But the streams from the mountains on each side are very rare compared with what is found below the Quayome, and water privileges are correspondingly valuable. There is of course a never-failing supply in the Fraser; but many of the benches are 600, and even, I should guess, 1000 feet above its present bed (by estimation); and considerable hydraulic works would have to be undertaken, and by very different ditches and on different principles from those now in force. It would be a question of engineering on a large scale.

The character of the country at Lytton is preserved all the way to the Fountains; and for as far as the eye can reach above the Fountains some 4 or 5 miles the whole of the country is tolerably well adapted for stock. It appears rather too dry a climate for arable cultivation. There is abundance of bunch-grass. Water is not everywhere met with on the benches above the river, but the Fraser is always there.

The soil is sometimes covered with shingles, at other times too sandy; but in general a light loam. The pine-trees already described appear, by their resinous spiky leaves, which straw the ground in great abundance, to make it much drier than it otherwise would be. These trees would soon be removed for firing, enclosures, and houses, and the country improve accordingly. There is no underwood.

We procured horses from the Indian chief Spindlem for carrying our blankets, &c., over this portion of the route. In consequence of the dangerous nature of one part of the trail, called the "Slide," a few miles above Foster Bar, 18 miles from Fountains, the mule-trail quits the Fraser at Foster Bar and ascends a small stream to an elevated plateau, descending by a beautiful valley to the plateau above the Fountains.

On the top of the pass we found (7th April) three lakes all frozen. Mr. Nicol and I got upon one, and found the ice about 4½ inches thick. This plateau, however, wherever the snow was cleared away, showed an uncommonly rich vegetation in grass, equal almost to that on the Pitt Meadows; a fine rich black mould, and uncommon advantages (save for its great cold) for dairy farming. It appeared as if an unbounded number of cattle might be maintained in this valley, or rather double valley and pass, the lower parts of which seemed well adapted for the plough.

The pass, which we estimated at about 16½ miles long from Foster Bar, opens on the two vast level plains, on the lower of which Fountains is situated.

These, each of them, contain apparently 1000 to 1500 acres, with scarcely a tree or deviation from level; covered only with bunch-grass, and terminated on all sides, except towards the mountains, by precipitous descents towards the river, each of which we conjectured to be not less than 500 feet; so that the upper plateau might be 1000 feet above the level of the river.

From hence Fraser River is seen coming down in a succession of beds in a narrow bed edged with high narrow benches from the north-west, closely confined by lofty mountains from 4000 to 7000 feet high.

On the southern part of the lower plateau are a few houses, stores, and tents. This is the Fountains. We had fresh meat here, the first since leaving

Fort Yale. We found that Captain Travaillet, who had promised to meet us here, had left on the previous day, leaving word that he would wait for us at the point where the Lilloet trail falls on the Fraser River. There were notifications of the new ditch orders, and that one Mr. Kelley, who kept stores there, was appointed to receive payment of mining-licenses and other Government moneys. The price of provisions was higher, if anything, here than at Lytton. The place seemed very dull. There were a few miners passing up and down. Some settlers seemed disposed to build; but the majority of those persons I saw wore an idle look. The bulk of the miners pass along the river far below, and, being supplied with their own provisions, they do not climb the high steep bank, at the top of which there is nothing to reward their pains; for the stores are of the commonest sort, and there are no drinkable liquors, nor, so far as I could see, any facilities for gambling. The spot is probably the best in the immediate neighbourhood for a town.

We left the Fountains the same afternoon for the place called Lilloet in this neighbourhood, i.e. the spot where the Lilloet route falls on the Fraser, and which I shall designate by the name Cayoosh. The river which drains the lakes Anderson and Seton, and falls into the Fraser at this point, is called "Nkoomitch Falls." But 2 miles above the Fraser it receives a considerable accession in the Cayoosh brook, which being more easily pronounced is preferable, and is used in the locality among the whites to designate the Nkoomitch proper. The trail, which is in general on a bench, with interruptions in some places, but which might easily be made into a good waggon-road, passes in front of the mouth of the Seclatqua or Bridge River at 2 miles; and at 4 miles below Fountains crosses by the ferry recently granted by Captain Travaillet to Aimable Bonnet and Calmel. The tolls are, perhaps, not too high for the present rates of wages and provisions. The right is only granted for a year, and at the end of that time, or of a second year, they might probably be revised. The ferrymen were about to establish immediately a boat for foot-passengers opposite Cayoosh, as it was found that many people crossed there. I saw a good deal of them during several days; they seem civil and well-conducted men.

Cayoosh is decidedly the most favourable position for a town that I have seen above Fort Hope, apart from its important position at the gorge of the Lilloet route. It is on the right bank of the river Fraser, at some distance from the river, and at a considerable height above it. The level benches on each side of the river, and which are all perfectly free from underwood, extend from above Fountains to a considerable distance below Cayoosh, on the left bank, and terminate a little below the junction on the right bank of the Fraser, a distance of at least 11 or 12 miles in length, and of a breadth in the whole varying from 1 to 4 miles. There are probably some 20 or 30 square miles of land ready for immediate occupation; the whole of which is fit for some description of farming, and about half of it admirably adapted for any description, either sheep, cattle, or the plough. In some places it is too sandy, in others too strong, for the plough; but in these places there is an abundance of bunch-grass, well adapted for stock of any sort. The soil is uniformly a red loam, in some places of exceeding richness and friability, degenerating in some parts into sand, in others covered thickly with large water-worn pebbles.

I have already pointed out to your Excellency a sketch of the particular plateau on which we, Mr. Nicol, and myself, thought a town could be with most advantage placed. It is on the right bank of the Fraser, immediately above its confluence with the Cayoosh.

Two chiefs, said to be of extensive authority, paid me a visit while at Cayoosh. They complained of the conduct of the citizens of the United States in preventing them from mining, in destroying and carrying away their

root-crops without compensation, and in laying wholly upon the Indians many depredations on cattle and horses which these Indians informed me were in part, at least, committed by "Boston men." On the other hand, many cases of cattle-stealing were alleged by the whites of all nations against the Indians; and stealing, indeed, of anything which could by possibility be eaten. For even the cattle which Indians stole they did not attempt to sell or make use of otherwise than as food; and it was admitted on all hands that many hundreds of Indians had died of absolute starvation during the winter. The Indians said that the salmon had failed them now for three years together.

The whites alleged, what is obvious to everybody, that the Indians are extremely averse to work, except under the pressure of immediate hunger; and that they are so improvident as rarely to look beyond the wants of the day, and never to consider the wants of a winter beforehand. If I may venture an opinion, I should think that this is much more true of the savages who have never been brought into contact with civilization than with those who have had even a little acquaintance with the whites. We found almost everywhere Indians willing to labour hard for wages, and bargaining acutely for wages; and perfectly acquainted with gold-dust, and the minute weights for measuring one and two dollars with. These circumstances are inconsistent with an utter heedlessness for next day's provisions, for in all cases we had to find these Indians in provisions as well as wages. And the amount of wages for the most abject drudgery to which human labour can be put, viz. carrying burthens, being 8s. per day and provisions, pretty uniformly wherever we went, shows of itself a very high average rate of profit as the wages of labour in British Columbia. If this is the average remuneration of the most unskilled labour, what ought skilled labour, supported by capital, to earn?

It was the uniform practice of storekeepers to entrust these Indians with their goods, generally 100 lbs. of flour, beans, or pork, and provisions for their own subsistence. Thefts were said to be unknown, and great care taken of their burdens. And these individuals who work I found extremely fleshy and hearty. My impression of the Indian population is, that they have far more natural intelligence, honesty, and good manners, than the lowest class—say the agricultural and mining population—of any European country I ever visited, England included.

At Cayoosh I tried to cause a grand jury to be summoned to present all these matters formally to me; but there were not twelve British subjects there.

The road from Cayoosh to Lake Seton, 16 miles, according to the point of departure, is in one part not practicable for mules. They ford the stream accordingly at present.

The muleteers propose to bridge the stream before the summer floods set in. They have already bridged it in one place, between Lake Seton and Lake Anderson, at their own expense of 180 dollars.

With one exception, there is no bridge on the Lilloet trail comparable to this; and with that one exception (worth, perhaps, 80 to 100 dollars), no ten bridges on that trail are together as considerable. This part of the route might be easily made a good carriage-road by means of two bridges, one of which, however, on to the bench at Cayoosh, would be a considerable undertaking. The rest of the distance would be a very simple matter indeed. The ground is flat and tolerably clear, the bottom very sound, large coarse gravel, affording excellent foundation; and there is on different slides from the cliffs any amount of beautiful naturally-broken macadam of any size. The actual trail shrinking from crossing the stream follows generally a narrow, rocky, precipitous, winding goat-path along the cliff. The mules follow the other trail partly.

On Lake Seton there is excellent access to the water; it never freezes. There are here two or three houses used by the boatmen and muleteers. This

little settlement I suggest may be called Seton Post. There is a very good whale-boat and a scow in bad condition on this lake. The mountains come down on it so steeply for the greater part of its length on both sides that I should consider a road out of the question.

At the upper end there were also a few houses, and another boat building, probably launched by this time. It is stated that from the point where the Nkoomptch and the Cayoosh join, the valley of the Cayoosh Proper leads to another large lake, which leads to a pass, the other side of which descends on Harrison Lake, a distance of three days. This point of junction of the Cayoosh and Nkoomptch is of course below Lake Seton; it would of course be extremely important to discover such a pass, as it would be shorter than the present Lilloet route from the mouth of the Harrison River to the middle Fraser, especially having in view the very bad access to the upper ends of the Lilloet and Harrison lakes at Pemberton and Douglas. I conceive, however, that a shorter way may be found, which will not pass over any part of the Harrison River, and which may proceed by this Cayoosh Lake across some pass yet to be discovered, down upon a very long valley, which opens upon Fraser River from the north-west, and falls upon Fraser River about 15 miles above the Harrison, and which was noticed last January and marked in the reconnaissance then made. There are a few houses at the upper end of Lake Seton which I suggest might be called Seton Head.

From Lake Seton to Lake Anderson, about 14 miles, is practicable for a cart. There seems very little fall in the stream which runs from one lake to the other. It might probably be canalized at no great expense; a steamer could then go from the upper end of Lake Anderson to the lower end of Lake Seton without unloading. I calculated the lengths at $13\frac{1}{2}$ to $14\frac{1}{2}$ miles for Lake Seton, and $12\frac{1}{2}$ to 13 miles for Lake Anderson. They are generally reckoned 3 miles longer, each of them; but boatmen usually exaggerate, and I was as careful as I could be and reckoned both by estimation and time. A steamer would be very useful, as we found on all the lakes. On every one we found either a dead calm, or a fresh breeze blowing up or down the lake, sometimes both ways at the different ends, which greatly delays the navigation in the row-boats now in use. On two lakes we had favourable winds; on two we were delayed for 24 hours by contrary winds.

At the upper end of Lake Anderson there is a pretty little site for a small town. The Lilloet trail, properly so called, commences here. It is a cart-way for some little distance; it might very readily, and for a few hundred dollars, be made practicable for carts for some miles, indeed at a very small expense for the whole distance to Lake Lilloet. It generally follows the old Indian trail, which may be seen here and there swerving to the one side or the other. It only deviates in two places close to Lake Anderson, and again a few miles before arriving at Lake Lilloet, in both instances apparently to avoid bridging streams which the Indians forded, and which could be bridged, the first for a very few score, the second for a very few hundred dollars. The deviations in each case appeared to be larger for the worse. There are many places in which a slight deviation, and the removal of a few barrow-loads of earth, or of a tree or two, would have effected a great improvement; but there the trail was followed.

The other deviation, near Lake Lilloet, leads by a shorter road over a hill to the lake. The Indian trail proceeds down the watercourse to the River Lilloet, some few miles above the head of the lake where there are reported to be some 5 or 6 square miles of exceedingly rich prairie-land. If the road were carried by a bridge across the Homush or Xobliash River, and again across the Lilloet, it would run nearly on a level all the way from Lake Anderson, and would open out this fertile valley, and fall on the Lilloet Lake at a point much better adapted for a harbour than that selected, and which is

only approachable within three-quarters of a mile when the lake is flooded. On neither side of the lake, indeed, is there any space for even a goat-path, unless it were hewn away. But on the side actually chosen (the E, or left side), there is for miles from the lake no place where three houses could be placed together; the ground is so excessively rocky and irregular, and there is no natural facility for forming a harbour. On the right side of the lake there are two islands which seem to invite a couple of spars to be laid, which is all that is necessary to form a beautiful harbour; and the country, once escape a couple of hundred yards from the lake, is capable enough of being built on. There is at present a complete monopoly thrown into the hands of the restaurateur in the only building at Pemberton.

Lake Lilloet is quite impracticable, I conceive, for a road along its shore. The terminus at the lower end (where there is also a restaurant) is very badly placed, and the people were about to remove it 400 or 500 yards lower down.

This lake connects, by a twisting rapid stream of about 1200 yards, with the Little Lake Lilloet, extending 6 miles further. This may at some future day be canalized so as to allow a steamer to run about 21 to 22 miles without unloading. At present the navigation of the upper lake stops above the rapids, and as a good level road may easily be made along the edge of the lake on the left shore, where the ground is flat, well wooded, and not too much underwood, not subject to overflow—in short, very well adapted for a road; not much use can perhaps at present be made of this lower or smaller lake.

For 20 miles further there might easily be a cart-road carried down the Lilloet, which it would probably be necessary to bridge twice. Mr. Nicol conjectured that a good bridge might cost 800 or 1000 dollars, but this was of course an estimate of the loosest description. There are some very curious hot-wells about 13½ miles from the lower end of the Lilloet Lake. The water issues from a mass of conglomerate 6 or 8 feet high, and the same width partially imbedded in the hill-side. From the centre issues the hot spring, large enough to fill a trough of the area of 4 inches square, probably at the height of about 2 feet from the bottom of the rock. On each side, out of the same mass of conglomerate, there issues a spring of cold pure water of about the same bulk, and all three unite in a small pool, and form one stream, which falls into the Lilloet about 100 yards off. The trees in the neighbourhood are of a singular vigour and beauty, both hemlock, cedar, &c., and also maple and other deciduous trees. The water is extremely soft and agreeable to wash in; it has a slight sulphurous taste, and also is slightly chalybeate. It has a very perceptible odour, but is perfectly clear and colourless. We had no means of testing its temperature accurately, but even after some admixture of the cold springs it is hotter than the hand can bear; I should say probably 140° F. We gave to it the name of "St. Agnes' Well."

The last 15 or 20 miles of the trail towards Port Douglas undoubtedly present greater difficulties than all the other part of the Lilloet route; and the worst part is that immediately falling on the Harrison Lake, which at present terminates at Port Douglas. This situation, though romantic and beautiful, and offering to vessels lying in its little lake a secure harbour during seven or eight months in the year, has such natural defects, that nothing but necessity can justify its adoption or retention for a moment. For four or five months in the year, if not for a longer period, it may be said to be inaccessible either by land or water, except on foot.

It is situated at the foot of a hill. The trail ascends, for upwards of an hour, immediately from high-water mark, and we found the greater part of this hill encumbered with snow to such an extent (18th April), that pack-mules could only make 10 miles in two days, and were nearly exhausted with that distance. In summer-time the snow will not be there, but the waters will then be out, and it is to be apprehended that some parts of this trail will be less passable in June than in April. The snow though often 4 and 5 feet deep, had begun

to melt a good deal during the day, though it generally froze again at night, and the trail was in several places for 100 yards ankle-deep in water; indeed, it often appeared as if the trail had been led into and along the dry bed of some watercourse by the persons who undertook to make the trail; a plan which is open to the objection, that when the waters are out, and a road is most needed, the road is at its worst. This observation is not to be confined to the portion of the trail next Port Douglas; on the contrary, this part shows more frequent indications of the hand of man than any other portion of the route. At one point, however, it is particularly annoying to find that the trail is conducted up and along some rather unusually broken ground with the very centre and strength of a waterfall of considerable size, far more than sufficient to turn any ordinary mill; and although we were able to scramble round it at a considerable risk of a tumble, and ankle-deep in water, it is probable that neither mule nor man can pass there in June; neither mule nor man could have stood on the trail when we were there. The waters were not out when the trail was laid out, and it is of the utmost importance that the whole locality should be carefully surveyed before the floods, and then again when they are at their height.

To return. Behind Port Douglas there stands this difficult hill. Before it lies a frozen lake for four months in the year, and when it is thawed (it had been quite open for some time when we were there) this little lake, about 2000 yards long by 250 to 600 wide, communicates with Harrison Lake by a tortuous, shallow, rapid stream, bearing only 12 inches water at its shallowest part (19th April). There is some flat land at the mouth, on both sides, but on the right bank liable to overflow, on the left dry; but both are liable to be frozen up by an unimportant bar of ice, however, compared with that which obstructs Port Douglas.

It is always referred to by storekeepers and carriers as the very worst and most difficult part of the whole trail to effect a transit over the frozen inner lake. A road might easily be constructed of a mile and a half in length along the left shore of this lake to the flat in question, which, however, will never be a good site; better, however, than the present, which if even the narrow channel and hill be disregarded or improved, has an irremovable objection in its ice, which this plan would avoid. It is densely wooded, so is all the valley behind Port Douglas.

On the right bank of the Lilloet a large flat is formed analogous to the delta at the mouth of many rivers, at present bearing a most magnificent growth of timber, principally cedar and hemlock. The soil is alluvial, and decayed vegetable matter, forming a rich red mould.

One or two small streams from the mountains north-west of the Harrison Lake fall through it. It is possible that a town might be raised here. In many respects it would have great advantages; it would have an open port all winter, and a level road up the valley of the Lilloet; whether it could be carried up that valley for 4 miles (where we quitted the stream), or even higher, by crossing and recrossing the stream, Mr. Nicol will probably report. We conceived that it would do for the site of a town when cleared, but the clearing would be very expensive; floods would probably, at all events occasionally, overflow the greater part of the level, and the bridging difficulties might be serious.

The Lilloet here is very violent, as is shown by the enormous bulk and quantity of drift-wood with which the upper end of Harrison Lake is strown, and which far surpass anything I have ever seen. We attempted to ascend it, in hopes of arriving at some level ground which we had been assured exists at a distance of 3 miles from the lake, and accessible for navigation; but, although the river is navigable for canoes, we satisfied ourselves that steam navigation was impossible. There is a fall of 15 feet in the 250 yards immediately above the lake, and a tortuous channel besides.

Bad as any harbour must be at this end of the lake, this side (the extreme right of the river-mouth) offers the best position; and, with the aid of the driftwood, a floating breakwater might be made. The only winds which are ever felt, apparently blow up and down the lake; and we found on our passage that the winds follow the shores.

It was surprising, with a population so unsettled, so often—a great part of it at least—changing, and so little habituated to the presence of law or justice, to find very few complaints, none of violent crimes.

It was alleged that liquor was sold unscrupulously to Indians. Some cases of alleged breach of contract, which the defendants maintained to be mistaken contracts, were brought forward; and it was also given us to understand that those who brought such circumstances to our notice were amongst the most audacious infringers of the law when the officers of the law were absent. It is of course impossible ever to do sudden justice under any written system of laws, and our efforts were not always successful in endeavouring to obtain in any way immediate satisfaction. But in a political point of view, these individual mischiefs were lost sight of, when it appeared that there was on all sides a submission to authority, a recognition of the right, which, looking to the mixed nature of the population, and the very large predominance of the Californian element, I confess I had not expected to meet. On the banks of the Lilloet there are very remunerative diggings, which I mention (though well known already) in order to make the remark that the gold in British Columbia is not all brought down by the Fraser, nor is the source of the gold confined to one region only in the canoe country or elsewhere. The Upper Lilloet Valley is separated from the Fraser by mountains in such a way as to exclude the idea that its course is through the primeval bed of some lake into which the ancient Fraser emptied all these treasures, or if not, the result would be the same, since the lake must have included half the colony at least.

The landing and embarking at Port Douglas appears to be extremely inconvenient. A great part of the town apparently will in June be standing in the water, and so far it will be convenient that barges should come alongside of the stores; but goods will have to be moved in boats, and I should think it must be very unhealthy. It is by far the most active, stirring-looking place we saw, nearly as large as Fort Yale.

The shores of Lake Harrison are in general steep to the water, and inaccessible for roads. There are some important breaks in the left shore, leading, as is believed, to the Cayoosh Lake. Another, near the foot, is reported by the Indians to lead in three days to the Forks of Thompson River.

But the rapids between the lake and Fraser River offer a very serious obstacle to the navigation here, and it may be that a short portage across from Fraser River into Harrison Lake may be found advisable from a point above the mouth of Harrison River into the lake near the hot spring, which we did not visit, but named "St. Alice's Well."

The distance from the lake to Fraser River I estimated at 11½ or 12 miles. The greater part of this is navigable for vessels of considerable draught. There is a shoal all along the exit from the lake bearing 5 to 6 feet in its shallowest part. About half-way down to the Fraser a considerable river comes in on the right bank, flowing from the reverse of the mountains, or rather hills, which lie west of Harrison Lake. This seems to change the nature of the current; however, from whatever cause, I never saw a river-bed present a similar appearance. The shoals being flat and liable to overflow, the river proper occupies a bed of some mile or mile and a half in width, extremely irregular in depth, gravelly, sometimes 2 feet deep, and at a boat's-length down the stream not 9 inches. The boatmen allege that this is caused by the salmon digging with their snouts. Giving the greatest credit to the fish and fishers for their industry and love of the marvellous, I thought it much

more nearly resembled the effect of the "ripplemark" observed in sands at low tide, and also in dry sands exposed to steady winds.

But I never saw the appearance on such an enormous scale. In the summer, when the waters are high, stern-wheelers can pass. But it must take a vast increase in the body of the water, and equivalent to a great many inches rise in the Fraser itself, to raise the surface of this part of Harrison River by a single inch, being very rapid and of the breadth I have mentioned.

The remainder of my route is so well known to your Excellency that I shall gladly bring this extremely lengthy communication to a close.

The chief points which struck me, to make a brief recapitulation, were,—

1. The ready submission of a foreign population to the declaration of the will of the Executive, when expressed clearly and discreetly, however contrary to their wishes.
2. The great preponderance of the Californicised element of the population, and the paucity of British subjects.
3. The great riches, both auriferous and agricultural, of the country.
4. The great want of some fixity of tenure for agricultural purposes.
5. The absence of all means of communication, except by foaming torrents in canoes, or over goat-tracts on foot, which renders all productions of the country, except such as, like gold, can be carried with great ease in small weight and compass, practically valueless.

Distances.	Miles.	Days' Journey.	Remarks.
Fort Yale to—			
Spuzzem .. .. .	..	1	Much snow; regained the river after 4 miles.
Quayome (Boston Bar) ..	..	1½	
Lytton (Port Dallas), Thompson Forks	..	2½	
Foster Bar .. .. .	..	1½	
Fountains .. .. .	..	1	
Cayoosh .. .. .	..	½	This is ½ a day, including the starting, unloading, &c., and ferry: it is a perfectly clear meadow.
Seton Foot.			
Seton Head (length of Lake Seton to Lake Anderson)	1½	..	The boatmen say 18 miles.
Anderson (the length of Lake Anderson).	..	..	The boatmen say 16 miles.
Pemberton (on Lake Lilloet)	24½	2	There is a good halfway-house.
Lake Lilloet (length upper lake).			
Hot springs, including lower lake 6 miles long.	13½	1	
Port Douglas (lower end Harrison Lake)	21	2	Another extra day for mules, 4 days from Lake Lilloet to Port Douglas.
Harrison River (from Lake to Fraser).	12	hours. 14½	From Port Douglas fore winds and down stream.

On foot the whole way except on the lakes and below Harrison Lake. The distances are estimated partly by adding the different distances arrived at as we came along the trail, some by time and estimated rate of speed. We generally walked 7 or 8 hours besides stoppages, sometimes 10 hours.

*XIX.—Explorations in Jarvis Inlet and Desolation Sound,
British Columbia. By Mr. W. DOWNTIE.*

Communicated by Sir EDWARD BULWER LYTTON, Bart., F.R.S., &c., H. M.'s
Secretary for the Colonies.

Read, December 12, 1859.

Mr. WILLIAM DOWNTIE to Governor JAMES DOUGLAS.

SIR,

Victoria, Vancouver Island, March 19th, 1859.

I have the honour to inform your Excellency of my return to Victoria, after a sojourn of sixteen weeks in British Columbia.

I have been for the last month in Desolation Sound. The snow and rain set in, so as to make it impossible to start over the mountains from the head of Jarvis Inlet to the Upper Fraser River for some time.

I then thought it would be as well to visit the Klahous country, as I had heard a great deal about it.

We started from the head of Jarvis Inlet on the 22nd of February for Desolation Sound, in a small canoe with four Indians, pick, pan, shovel, and rocker; came down the west entrance of Jarvis Inlet, which is much better than the eastern. From Scotch-fir Point, up the coast, it is shallow, and rocks and reefs running out a good distance from the shore.

It was most refreshing to come down on the gulf, where the land had all the appearance of spring, and after being so long up the inlet. No snow on any of islands along the coast except Taxada. Savary Island has all the appearance of a farm under cultivation, from the abundance of grass on it: large patches of farming-land make it look very enticing, but the water is scarce for farming purposes; but there are excellent pastures for stock all the year round. The mainland opposite this island changes in appearance with regard to the rock formation: quartz and slate along the shore up to Sarah Point.

We arrived safe in Desolation Sound, which does certainly look somewhat desolate in a snow-storm, but I am well pleased with the prospect of this section.

This is the first time I have seen pure veins of sulphuret of iron, which looks very much like silver. The first I saw of it was a small square piece in the possession of an Indian: I offered him some tobacco for it, but he would not part with it, even if I gave him its weight in gold. I came across a number of seams of the same kind. It lays in the quartz, the same as gold. I have no idea that the gold is confined to Fraser River alone; and if it can only be found from the seaboard, or on the rivers at the head of some of these inlets, the country will soon be prospected.

Bute Inlet (Homattheo), that runs so much farther north than this inlet, has a large river emptying into it from the north-west. This river looks most favourable for gold, and I should much like to have prospected it; but the Indians would not go, as they were afraid of the Euclitus tribes: the principal reason, however, being that the canoe was small, and we were not altogether prepared to give it a fair trial. It was snowing most of the time, and rather discouraging.

Camped near the Klahous Indian village, they paid me a visit, as a matter of course, and I gave them all a small piece of tobacco. They seemed well pleased; but they would have a look at our mining-tools, canoe, and blankets, and our general appearance. When they had satisfied themselves on these points, they told my Indians I was not a Tyeo—meaning a chief, a person of consequence (this was the unkindest cut of all). My Indians told them I was a Tyeo; but it was of no use. They said a Tyeo would have a large

canoe and plenty of blankets: whereas there was nothing of the kind visible, only picks, pans, and an old rocker,—and what was the use of that among Indians?

I did not feel disposed to find fault with the poor Klabous Indians for judging from outward appearance, and, upon the whole, I got along with them very well. We got a few potatoes from them, so there must be something else besides rocks in Desolation Sound.

We went up to the head of the inlet, where the "Deserted Village" is on the map, but there were no Indians there. It looked as much like a deserted village as it did when it was named by Vancouver. About two miles above this, the river comes in from the north-east. The sand washing out of the river has formed a large flat at the head of the inlet, in some places dry at low-water. We had some difficulty in getting the canoe into the river, which is also shallow, being filled up with sand from the continued wash from the mountains.

We went up the river about five miles. The Indians told me it would take five days to go to the head of it. Judging from the way a canoe goes up such rivers, the distance would be about sixty miles, which must be a long distance above the Squamish, and would not be far from the Lilloet. The Indians have gone this route to the head of Bridge River (Hoystier), which it may prove to be the best route to try. It is very evident there is a pass in the Coast Range here, that will make it preferable to Jarvis Inlet or Howe Sound. If a route can be got through, it will lead direct to Bridge River.

I have seen more black sand here in half a day, than I did in California in nine years: it looks clear and bright as if it came from quartz.*

Seeing that it was out of the question to proceed farther, we put back and came down along shore, breaking and trying the rocks, but did not discover any gold. Lots of iron pyrites or sulphuret of iron.

The land on each side of the river is low, and must be overflowed in many places in spring; but for all that, if a trail can be found through, it will not be difficult to make a road along the banks of the river.

In coming down we passed through what on the map is called the Island "Redonda." This is a fine passage, and shortens the distance about ten miles in going to Klabous Inlet.

The distance from Klabous Inlet to Homattheo Inlet (Bute Inlet on the chart) is about 30 miles; but I could not get the Indians to go in the small canoe.

The Indians told me that the colour of the water in the large river that comes in at the head of Homattheo from the north-west, was the same as Fraser River; and thus when I proceed thither, I should be in or near the range of Queen Charlotte Islands, where I should get gold.

We had a hard passage to Nannimo; but arrived all right, paid off the Indians, and heard from Captain Stuart that he had forwarded supplies to Jarvis Inlet by order of your Excellency, so that I was all ready for a start again to Desolation Sound, if I could obtain a small decked boat.

Fort St. James, Stuart Lake, New Caledonia,
10th October, 1859.

SIR,

I beg to make the following report of my trip to Queen Charlotte Islands and my journey thence by Fort Simpson to the interior of British Columbia.

Having left Victoria on the 27th July, with twenty-seven practical miners, with stores, &c., for three months, we arrived in Gold Harbour, Queen Charlotte Islands safely, on the 6th August, and immediately set about prospecting.

We examined the spot where a large quantity of gold was formerly taken

* Magnetic iron ore?—R. I. M.

out, and discovered a few specks of it in the small quartz-seams that run through the slate; two of the party blasting the rock, while others prospected round the harbour.

I then proceeded in a canoe to Douglas Inlet, which runs in south of Gold Harbour, hoping to find traces of the Gold Harbour lead, but without success. The nature of the rock is trap or hornblende, with a few poor seams of quartz straggling over the surface. Granite was found at the head of this inlet, but not a speck of gold. Next day we went up an inlet to the north of Gold Harbour, and here a white rock showed itself on the spur of a mountain.

After a difficult ascent we found it to be nothing but weather-beaten, sun-dried granite, instead of quartz. Farther up the inlet we saw a little black slate and some talcose rock, but nothing that looked like gold. On our return, we found that the men engaged in blasting the rock had given it up; the few surface specks being all the gold that could be found.

The large amount of gold that was formerly found with so little difficulty, existed in what is called an offshoot or blow. The question then arises how did the gold get here; some of our party were of opinion that a gold-lead exists close at hand, but it can only be put down to one of the extraordinary freaks of nature so often found in a mineral country.

The offshoots in question are not uncommon, as I have often seen them in California. On such a discovery being made, hundreds of miners would take claims in all directions near it, and test the ground in every way, but nothing farther could be found, except in the one spot, about 70 feet in length, running south-east and north-west; on being worked about 15 feet it gave out. Before work commenced I have blown the sand off a vein of pure gold.

I now proposed to test the island farther, and started for the Skidegate Channel. At a village of the Crosser Indians, where we were windbound, the appearances were more favourable. Talcose slate, quartz, and red earth were seen. We tried to discover gold, but without success. Sulphuret of iron was found in abundance, and we discovered traces of previous prospectings; the Indians understand the search for gold well, and detect it in the rocks quicker even than I can.

The coast from the Casser Indian village to Skidegate Channel, is wilder than any I have ever before travelled, and we did not care to hunt for gold in such a place. Five Indians were drowned here to-day, while fishing.

At the Skidegate Channel we found black slate and quartz prevailing; farther north granite appears, and then sandstone and conglomerate; and as we were now in a coal country, it was no use to look for gold.

We saw coal here, but I cannot speak as to its quality, not being a judge of it. The formation is similar to that of Nanaimo. From this we returned to Gold Harbour, where a party which had remained behind to prospect inland had met with no better success than ourselves. We then consulted what was the best thing to do; I did not wish to return to Victoria, as your Excellency had desired me to explore some of the inlets on the mainland, and I left Gold Harbour with a party of fourteen men for Fort Simpson, where we arrived in eight days. The north-west coast of Queen Charlotte Islands is a low mud and gravel flat, having no resemblance to a gold country.

I left Fort Simpson for the Skeena River on the 31st August. From Fort Simpson to Fort Essington is about 40 miles; the salt water here is of a light-blue colour, like the mouth of Fraser River, and runs inland about 30 miles. The coarse-grained quartz of Fort Simpson is no longer seen here, and granite appears; and the banks of the river are low, and covered with small hard wood and cotton-trees, with some good sized white oaks, the first I have seen west of Fraser River.

Vessels drawing upwards of 4 feet of water cannot go more than 20 miles up the Skeena River, and it is very unlike the deep inlets to the southward.

At our camp here some Indians visited us, and told us that they were honest, but next morning the absence of my coat rather negatived their statement. Next day we found the river shoal even for loaded canoes, as it had fallen much. At our next camp I went up a small river called Scenatoys, and the Indians showed me some crystallized quartz, and to my surprise a small piece with gold in it, being the first I had seen in this part. The Indian took me to a granite slide whence, as he asserted, the piece of quartz had come. I found some thin crusts of fine quartz, but no gold. From the river Scenatoys to Fort Essington, at the mouth of the Skeena River, is 75 miles; a little below the Scenatoys an Indian trail leads to Fort Simpson, through a low pass, and the distance is not great.

From this, 10 miles farther up was a river called the Toes. On the south side hence is an Indian trail to the Kitloops on the Salmon River, the south branch of Salmon, which river is called Kittama.

By this time we were fairly over the coast range, and the mountains ahead of us did not look very high; the current here was very strong and much labour was required to get our canoe along, and we had to pull her up by a rope from the shore.

Gold is found here, a few specks to the pan, and the whole country looks auriferous, with fine bars and flats with clay on the bars; the mountains look red, and slate and quartz were seen.

The next camp was at the village of Kitlaska, and I started in a light canoe ahead of my party, as our canoe, by all accounts, could not proceed much farther, and I then determined to penetrate to Fort Fraser. The Indian who was with me, told me that a large stream called the Kitchumsala comes in from the north, the land on it is good and well adapted for farming, and that the Indians grow plenty of potatoes. To the south is a small stream called the Chinkoatsah, on the south of which is the Plumbago Mountain, of which I had some in my hand, as clear as polished silver, and runs in veins of quartz.

Near to this on a tree are the words "Pioneer, H. B. C.," and nearly overgrown with bark; the Indian told me it was cut by Mr. John Worth, a long time ago.

From this to the village of Kitecoonsa the land improves, the mountains recede from the river and fine flats run away 4 or 5 miles back to their bases, where the smoke is seen rising from the huts of the Indians engaged in drying berries for the winter. These Indians were very kind to us, and wished me to build a house there, and live with them.

Above the village of Kitecoonsa, the prospect of gold is not so good as below. As the season was so advanced I was not able to prospect the hills which look so well, and unless the Government takes it in hand, it will be a long while before the mineral resources of this part of British Columbia can be known. This is the best-looking mineral country I have seen in British Columbia.

From here to the village of Kitsagatala the river is rocky and dangerous, and our canoe was split from stern to stern.

At Kitsagatala we entered a most extensive coal country, the seams being in sight and cut through by the river, and running up the banks on both sides, varying in thickness from 3 to 35 feet.

The veins are larger on the east side and are covered with soft sandstone, which gives easily to the pick; on the west side quartz lines the seams, which are smaller. The veins dip into the bank for a mile along the river, and could easily be worked by tunnels on the face, or by sinking shafts from behind on the flats, as they run into soft earth.

I have seen no coal like this in all my travels in British Columbia and Vancouver Island.

We experienced some danger from Indians here, but by a small present of tobacco, and by a determined and unconcerned aspect, I succeeded in avoiding

the danger of a collision with them. We could go no farther in the canoe than Kittamarks or the Forks of the Skeena River, and we had been twenty days from Fort Simpson; though the journey could have been done in a third of that time.

On the 21st September I left Kittamarks with two white men and two Indians, and started over a fine trail through a beautiful country for Fort Fraser. We crossed over an Indian suspension-bridge and entered some first-rate land, our course being about east; we completed about 12 miles to-day. Next day it rained hard, but we succeeded in doing 12 miles again, passing through as fine a farming country as one could wish to see. To the south-east a large open space appeared, and I have since learnt that a chain of lakes runs away here, being the proper way to Fort Fraser, but as I always follow my Indian guides implicitly, I did so on this occasion. The third day the weather was fine but the trail not so good; it ran along the side of a mountain, but below the trail was good and grass abundant. My Indians started after a goat up the mountain, but were quickly driven back by three bears. The fourth day we crossed what is called the Rocky Pass, which may be avoided by keeping the bottom. To the north a chain of mountains were seen covered with snow, distant about 30 miles, where the Hudson Bay Company have a post called Bears' Fort; to the south is the Indian village Kispyathie; along the bottom runs the Skeena past the village of Allagasoneda, and farther up the village of Kithathritts on the same river.

On the fifth day we encountered some dangerous-looking Indians, but got away from them. We passed through a fine country with cotton-trees and good soil.

We now arrived at the village of Naas-Glee, where the Skeena River rises. We were again on the river which we had left five days ago, having travelled 55 miles, when we might have come by the river. We had great difficulty with the Indians here, and it was fortunate that I knew the name of the chief, as otherwise they would have seized all our property; as it was, they surrounded us and were most importunate; one wanted my coat, another my gun, a third took my cap from my head, and I really thought that they would murder us. These Indians are the worst I have seen in all my travels. Naas-Glee is a great fishing-station, and all the worst characters congregate there to lead an indolent life. Thousands of salmon were being dried at this village.

We hardly knew what to do, as they told us that it was ten days to Fort Fraser, and if we returned they would have robbed us of everything. I therefore determined to go on, if the Chief Norra would accompany me, and on giving him some presents he consented to do so. The river from Naas-Glee downwards is very rapid, but as the banks are low and flat, a waggon-road or railroad could easily be made.

The land around Naas-Glee is excellent, and wild hay and long grass abounds. Potatoes are not grown here, owing to the thieving of the Indians. There is no heavy pine-timber hereabouts, and the canoes are made of cotton-wood.

Above Naas-Glee the river was very rapid, and it required all our energy to get along, as we had but a small quantity of dried salmon to last us ten days. Ten miles above Naas-Glee is an old Indian village, called Whatatt; here the short-water ends, and we enter the Babine Lake. Going through a fine country, we accomplished 20 miles this day, the lake being broad and deep. Next morning to my surprise I found a canoe at our camp, with Frenchmen and Indians, in charge of Mr. Savin Hamilton, an officer in the service of the Hudson Bay Company from Fort St. James, Stuart Lake, New Caledonia, whither we were bound. He was on his way to Naas-Glee to purchase fish, and advised me to return with him to Naas-Glee, and then to accompany him to Stuart Lake, but as I had seen enough of Naas-Glee I declined his offer,

with thanks. Mr. Hamilton expressed his surprise that we had managed to get away from Naas-Glee, as we were the first white men who had come through this route; and even he found much difficulty with the Indians there. Having persuaded Narra, the chief, to let us have his canoe, we bid farewell to Mr. Hamilton, and proceeded on our journey.

It was fortunate that we sent back our two Indians, as otherwise we should have suffered from want of food, and as it was, we reached Stuart Lake only with great difficulty. We made a fine run to day before a fair wind to Fort Killamoures, which post is only kept up in the winter. Our course from Naas-Glee to this place was south-east, and the distance about 50 miles. The land is good the whole way, with long grass on the benches near the fort, which is a very lovely place. It is a great pity to see this beautiful country so well adapted to the wants of man, lying waste, when so many Englishmen and Scotchmen would be glad to come here and till the soil. Babine Lake is deep, and in some places 5 or 6 miles wide, with islands and points of land to afford shelter from storms; from Fort Killamoures to the head of Babine is about 40 miles, direction south-south-east. From the head down about 20 miles, it runs east and west. We arrived at the head of Babine on the seventh day after leaving Naas-Glee: we had seen no Indians nor snow, and had made a favourable journey.

The district we had passed was well adapted for farming; some of the land is rocky, but on the whole it is a fine country.

At the head of Babine Lake there is a good site for a town, and a harbour could be made, as a stream flows in which would supply the town with water. This is what I call the head-water of the Skeena River; the lake is navigable for steamers and 100 miles in length.

From this to Stuart Lake there is a portage over a good trail, through the finest grove of cotton-wood I have ever seen; the ground was thickly strowed with yellow leaves, giving the scene quite an autumnal appearance, and presenting a picture far different to what we expected in this part of British Columbia.

Six miles from Babine, we came to a small lake where were some Indians fishing herrings: on our approach they appeared undecided whether to run or remain. I asked them for some food, and they soon provided us with some fish which refreshed us much, and having paid for our repast, we started again. From this a small stream runs a distance of 4 miles to Stuart Lake.

Arrived at Stuart Lake we found no means of crossing, no Indians to direct us, and no food to sustain us, nor had we any shot to enable us to kill ducks. We camped here three nights without food, sleeping the greater part of the time to stifle our hunger. The only thing that supported us was the great idea of the enterprise in which we were engaged, having been the first to explore the route from the Pacific to Fraser River.

One of our party found an old canoe split to pieces; this was rigged on a raft of logs, as well as circumstances would admit.

I returned to the Indians above mentioned and purchased a few herrings, and walked back to our camp with difficulty and found my limbs giving way. Next morning we started on our frail raft, expecting every moment to go down; we were obliged to sit perfectly still, as the least movement would have upset us; a slight breeze sprung up and a small sea washed over us and we had to run for a lee-shore, where kind Providence sent an Indian to succour us. He welcomed us with a "Bonjour," invited us to his lodge and gave us most excellent salmon-trout from the lake. We had at last reached this spot with thankful hearts for our preservation through so many dangers. We stayed a night with this good Indian, and next day gave him a blanket to take us to the Fort. We abandoned our old canoe without regret, and proceeded towards our destination. The Indians all along this were very kind to us. About

half-way across Stuart Lake we obtained a small prospect of gold. On the north side of the lake for about 20 miles the ground is rocky, but south toward the Fort the land is good and will produce anything.

We reached Fort St. James on the 9th October, and were received by Mr. Peter Ogden with that kindness and hospitality which I have always found at the Hudson Bay Company's posts.

The Fort is very much exposed to all winds, and I found it colder than anywhere on the journey.

Stuart Lake is 50 miles long. The portage to Babine 10 miles; Babine Lake 100 miles; from Naas-Glee to Fort Simpson 250 miles, and 200 miles from Fort Simpson to Gold Harbour, Queen Charlotte Islands.

The names of the two men who accompanied me were William Manning an Englishman, and Frank Choteau a French Canadian. It is possible that I shall prospect the Fraser a little farther this fall.

Extract from the 'Pioneer' and 'Democrat.'

From the 'Dalles Journal,' October 24. New and Rich Gold discoveries on the Si-mil-ka-meen River.

AN Expressman named M'Guire, arrived at the Dalles in the early part of the week from Captain Archer's command, reports the discovery on the Si-mil-ka-meen River, about 5 miles from the camp. According to our informant, the discovery is confined to a small bar on the river, which is being worked by soldiers, Quartermaster's men, and a large number of Indians. The men from camp go down after breakfast, walking a distance of 5 miles, and working not more than half a day, average about 20 dollars to the hands. This is without the ordinary conveniences for mining, and with nothing but picks, using frying-pans for washing out. With "rockers" it is estimated that from 50 to 200 dollars to the hands could readily be taken out. We have not learned that any of the neighbouring bars have been prospected, but it can scarcely be possible that the rich deposits are confined to one locality, and when a thorough examination is had, it is more than likely that rich strikes will be made all along the course of the river. M'Guire, who is represented to us as an entirely reliable man, says that he himself visited the diggings and saw the miners at work, taking out gold at a rate fully equal to that stated. It is represented that the officers in command are very anxious to conceal all knowledge of the discovery, they apprehending an immediate rush that in the present condition of the country must be attended with great privations. The nearest point at which supplies necessary to the miner can be obtained is at Colville, which is over 100 miles distant from the newly-discovered mines. The Indians, too, are represented to be decidedly hostile, and inasmuch as the troops are about to remove, miners would be exposed to constant attacks from savage foes. We mention these facts as a caution against a wild and headlong rush; but should the mines prove half as rich as represented, not all these dangers twice over would serve to check the crowd of gold-hunters that from all quarters will hie to the new El Dorado. The Expressman who brings the news says that he has been all through the California mining districts, but nowhere has he seen dirt that prospected so well as that at the Si-mil-ka-meen gold-mines. The discovery, we are told, was made by Sergeant Compton, in whose honour the locality has been named "Compton Bar."

The effect of this news has been to create quite an excitement in our town, but as yet we hear of no departures for the new gold-mines. Should the next advices confirm these startling reports, we may expect to witness a stampede scarcely equalled by that to Fraser River.

Since writing the above we have been permitted to make the following extracts from letters received at this place from officers of the army attached to the boundary survey.

Although the discoveries made are to a limited extent, yet they prove what we have heretofore asserted as our belief in the existence of gold in that part of Washington Territory, and the Upper Columbia, to be correct.

It is now, however, too late to prosecute the investigation this season, but we do not entertain a single doubt that during the next spring and summer developments

will be made which will establish the fact of that part of the country being—as we have always believed it was—equal, in mineral wealth, to any part of California or Mexico.

Extracts from Letters.

" Camp, Si-mil-ka-meen, October 8, 1859.

" * * * I am detached with 14 men at the N. W. B. station on the Si-mil-ka-meen, about 12 miles from its mouth. * * On the 6th my sergeant showed me the result of six pans which he washed, and we found it to be worth 6 dollars. On the 7th two men obtained 20 dollars each; others from 5 to 15 dollars. We have no tools or conveniences, and the men knew but little about digging gold. I give you the simple facts, and shall make no comments. * * * It is much coarser gold than they found on Fraser River, some pieces weighing 2·50 dollars.

" This river is very incorrectly mapped, as it is 150 miles long with numberless tributaries. It is a swollen mountain-torrent till the middle of July, so that it is late before it can be worked. It is my opinion that this gold was washed out of the hills contiguous, this year, as these diggings thus far have been on the *surface only*. You know that gold will always, if you give it time, find its way to the bed rock. I do not know that they will be developed soon as we shall leave here in ten or twelve days, and it will not be safe for a small party to attempt to mine. These Indians want a severe thrashing, and then the country can be travelled with safety. Our command has kept them civil, otherwise there would have been the devil to pay as usual."

" Camp Osoyoos, W. T., October 10, 1859.

" * * * As many gold-fevered letters were doubtless despatched by the regular mail, it may be important to the exciteable population of your city to have correct accounts from the diggings. It is true that a rich placer, yielding from 10 to 30 dollars a day to the hands, has been discovered, 10 miles above the forks; but the gold is confined to a single locality, the extent of which is not more than 25 by 10 yards.

" White, whom I sent out to prospect the stream for 4 or 5 miles above and below the placer, has failed to find it in remunerative quantities at any other point. It seems to be the opinion of experienced California miners that, rich as the placer is, it will be worked out in less than two weeks, and that there is no more gold on the river worth mining.

" I mention all this in order to prevent men who may have heard exaggerated accounts from coming this fall. Possibly next spring or summer, miners might come and discover something better, but to come from the Dallas now would end in nothing but suffering and disappointment.

" I was always confident that gold existed in the mountains of this territory, and expected a discovery by some one of the many expeditions which went out last spring."

XX.—*Extracts from the Despatches of DR. DAVID LIVINGSTONE, M.D., Gold Medallist R.G.S. (dated December 17, 1858; February 14, May 12, July 26, and October 15, 1859) to the Right Honourable Lord Malmesbury.*

Communicated by the FOREIGN OFFICE.

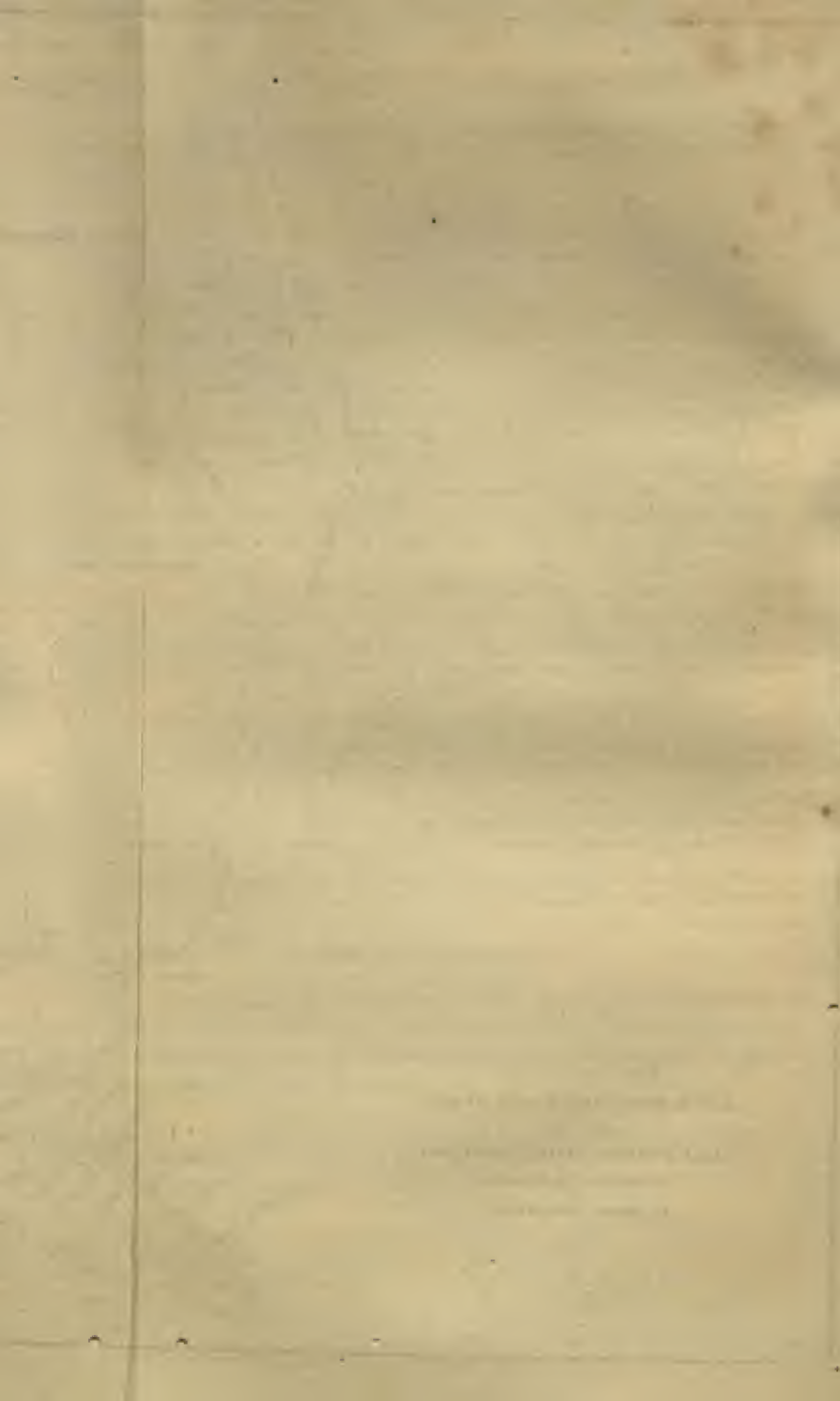
Rond, January 10 and November 28, 1859; March 26, 1860; and April 22 and June 10, 1861.

No. 1.

December 17th, 1858.

MY LORD,—All the members of the Expedition having been comfortably lodged about the beginning of November, in the house of Commandant Sicard, which he kindly gave up for our use, it





seemed advisable that the rapids of the Kebra-basa should be examined while the water in the Zambesi was still at its lowest. They were not seen by me in 1856, and, strange as it may appear, no one else could be found who could give an account of any part except the commencement, about 30 miles above this. The only person who had possessed curiosity enough to ascend a few miles, described it as a number of detached rocks jutting out across the stream, rendering the channel tortuous and dangerous. A mountain called Panda Maboia (Copper Mountain—a mass of saccharine marble at the top, contains joints of the green carbonate of copper, which is said to have been worked—hence the name) stretches out towards the range of hills on the eastern bank, so as to narrow the river to 60 or 80 yards. This is the commencement of Kebra, or, more correctly, Kabra-basa. We went about 4 miles beyond Panda Maboia, in this little steamer, and soon saw that the difficulty is caused by the Zambesi being confined by mountains to a bed scarcely a quarter of a mile broad. This bed, viewed from a height, appears covered with huge blocks of rock, interspersed with great rounded boulders. Large patches of the underlying rock, which is porphyry and various metamorphic masses huddled together in wild confusion, are also seen on the surface; and winding from side to side in this upper bed, there is a deep narrow groove, in which, when we were steaming up, the usual call of the man at the lead was, “no bottom at 10 fathoms.” Though the perpendicular sides of this channel are generally of hard porphyry or syenite, they are ground into deep pot-holes, and drilled into numerous vertical grooves similar to those in Eastern wells, where the draw-rope has been in use for ages; these show the wearing power of the water when the river is full. The breadth of this channel was from 30 to 60 yards, and its walls at low water from 50 to 80 feet high. At six or seven points there are rocky islands in it which divide the water into two or three channels for short distances. The current, which we generally found gentle, increases in force at these points to four or five knots, and as our vessel has only a single engine of 10-horse power, it can scarcely stem that amount in open water; and besides, being of an extremely awkward and unhandy “canoe-form,” and only one-sixteenth of an inch in thickness, it is evident we cannot risk her in any but the gentlest currents. The attempt to haul her through would have doubled her up, so we left her at the beginning of the first rapid, and went forward to examine the parts above on foot. The usual course traders have pursued is to come to a point below, where we left the steamer in canoes, and leaving them there, go overland through the level Shidima country, well away from the mountains which skirt the river, and when they reported an impediment to navigation, they referred to the un-

wieldy canoes only in common use on the lower parts of the Zambesi. These cannot paddle against a 4-knot stream; nor can they punt at a depth of 60 feet, nor tow along a precipice often 80 feet high, and always smooth, slippery, or jagged. But though there is an impediment to canoe-navigation, it would prove none during four or five months each year to a steamer capable of going 12 or 14 knots an hour.

With Dr. Kirk, Mr. Rae, and some Makololo in company, we marched about 12 miles nearly north from the entrance, at Panda Maboia. The upper bed, in which we were travelling, was excessively rough, but we occasionally got glimpses of the river at the bottom of the groove, and saw four rapids. The people having all fled from some marauding party, we could neither get provisions nor information, and returned in order to organize a regular exploration of the whole difficulty.

Major Sicard having found out that a native Portuguese, S^o. José Santa Anna, had, when young, hunted elephants among the mountains which confine the Zambesi, engaged him to accompany us in our second expedition, which consisted of the seven members of our party and ten Makololo. Leaving the steamer at a safe spot above Panda Maboia, we proceeded up the left bank, the different members pursuing their several avocations as much as the roughness of the march would allow. A careful sketch and a photograph were made of the worst rapid we had then seen; there was a fall of about 5 feet in 20 yards, but on our return a rise of the river of between 3 and 4 feet had made it nearly level.

Crossing the Luia, a small river coming into the Zambesi from the north-east (lat. 15° 37' s.), we turned westwards, and soon reached the beginning of the range Shiperizioa, which, without knowing the name, we had previously seen. This part of the river our guide had only once seen from a distant mountain, and supposed what was now only a small, and by no means steep rapid, to be a large waterfall. The range Shiperizioa appearing to end in a fine peak at least 2300 feet high, we resolved to ascend it and get a view of the river beyond. A hippopotamus having been killed, a party was left to cut up the meat while we went on to the peak. It was found inaccessible from the river-side. It forms the most prominent feature in the landscape, and we thought it right to pay a compliment to our Portuguese friends, by naming it Mount Stephanie, after their young Queen. As our guide, S^o. José, had hunted all along the river to Chicoua, and a party of natives who came to beg meat, agreed with him in asserting that no waterfall existed above Mount Stephanie, we began our return to the steamer. But after one day's march homewards one of the Makololo mentioned that he had received information of the existence of a larger cataract than any we had seen, and that

too from one of the above-mentioned party of natives, it was at once resolved that Dr. Kirk and I should return and verify this, while the rest of the party worked their way downwards.

Accompanied by four Makololo, we now proceeded by the back or northern side of Mount Stephanie, and were fortunate enough to find a village situated in a beautiful valley, with a fine stream of water running through it. The people are called Badéma, and though mountaineers, possess but little of that brave character which we are accustomed to ascribe to such people. They generally flee from strangers; their gardens were seen on the highest parts of the mountains; some of them on slopes at an angle of 70° , where there was very little soil. They cultivate the native cotton in preference to the imported, as the former, though yielding less, has by far the strongest fibre, and the plants continue yielding annually, though burned down to the ground. They support the branches which remain by trellice-work, as we do grape-vines; their looms are of the most primitive description, but they value the cloth made from them much more than they do our more beautifully woven fabrics.

Zandia, the head man of this village, furnished us with two guides to take us to Pajodzi, the point to which canoes are accustomed to descend; for though he asserted that there was no waterfall, we considered it our duty to see all the difficult part by descending from that point before reporting to Her Majesty's Government. The next village we came to gave a totally different account; the men asserted that there was a waterfall so frightful as to be perfectly unapproachable: "no elephant had ever gone near it, nor hippopotamus; not even an alligator could reach it, and a man might perish with thirst in sight of, but unable to approach it." On asking how they happened to get near this frightful abyss, they replied that it was more accessible from the other side. They had a political reason for not showing us the river; the Banyai, on the opposite lands (Shidima), have been in the habit of extracting large payments from the traders for leave to pass. Eighty fathoms of calico are sometimes paid to a single village, and the villagers here were afraid that blame would be imputed by the Banyai to them in the event of our opening a path whereby their exactions would be avoided. By insisting that our two guides from Zandia should fulfil their bargain, they went on, but led us to a point near Mount Stephanie, where, emerging from the mountains, we found ourselves a good thousand feet above the Zambesi; the mountains on both sides slope at a high angle down to the water, and there is no upper or flood-bed. The water, about 300 yards broad, appeared to us at the height we first saw it, not more than a third of this width. The guides pointed to a rapid, caused by two rocks about 8 feet high in the middle of the

stream, as the waterfall; but refusing to credit them, we resolved to go up along the bank westward. On descending to the water's-edge we found the steep sloping bank covered with enormous boulders, with a black glaze, as if they had recently been smeared over with tar. Wherever the water flows over rocks for a long time this peculiar glaze appears; it has been observed in the Congo, and has been mentioned by Humboldt in the Orinoco. The guides declared that it was totally impossible to go further, though their soles were furnished with a thick cracked skin similar to that of the elephant. The marks of these cracks were visible on the sand they trod upon. The Makololo head-men—very willing fellows—showed me their feet on which the blisters were broken by the hot rocks over which we had climbed, and said they were fairly done up; that it was evident the villagers magnified the difficulty from political motives; and that there was no impediment save such as we had already seen. On urging them to make another effort, they said that they “always imagined I had a heart till then; they were sorry Kirk could not understand them, for he would acquiesce in their views and go back—I had surely become insane;” and next day they endeavoured by signs to induce him to return. Leaving them there Dr. Kirk and I went on alone; but while striving with all our might we could not make more than one mile in three hours. It was in truth the worst tract I ever travelled over; our strong new English boots were worn through the soles. The sun's rays were converged by the surrounding hills into a sort of focus, and the stones were so hot the hand could not be held on them a moment, though we were in danger of being dashed down into the crevices by letting go for an instant. The reflection from the rocks felt exactly like the breath of a furnace. I felt sure that if I had come down this way in 1856 instead of through the level Shidima country, I should have perished before reaching Tette; for now, with but a fortnight's exposure, and an examination of about 30 miles, we all returned as lean and haggard as if we had been recovering from serious illness. One of the Makololo came up to us in the afternoon, and seeing farther progress to be impracticable, we were returning, when we met the rest of the party. After sleeping among the hot rocks, where no covering is necessary, we next day induced the guides and Makololo to go on through the spurs from the mountain, along whose flank we were toiling, until they became perpendicular cliffs, requiring a great deal of dangerous climbing to get past; in the afternoon we were rewarded by the sight of a cataract called Morumbua, the only one we had seen deserving the name; on both sides there are perpendicular walls of rock, along the face of which no towing-line could be carried. The inaccessible sides are 500 or 600 feet high. The cataract itself presents a fall (as nearly as we could guess at

a distance of 500 yards) of 30 feet, and the water comes down at an angle of 30° . When the river is full it is at least 80 feet higher than when we saw it, and no cataract is visible at the place we saw the broken water. We stood in a pot-hole and dropped down a measuring-tape 53 feet to the level of the water. In flood the river at that same pot-hole is at least 30 feet deep. We witnessed on our return the effect of a 3-feet rise, in rendering a cataract already mentioned, of 5 feet, nearly level. It is quite a moderate computation to say the perpendicular rise among the hills is 80 feet. This, while it obliterates some rapids, will, in all probability, give rise to others; and the disparity of statement among the natives may partially be accounted for by their having seen the river at different stages of flood. Resolving to return and examine the whole when the river is in full flood in February, we commenced the ascent of the high mountain behind us, and were three hours in cutting our way through the tangled forest which covers it and all the mountains here. The rains are unusually late this year, but the trees had put on fresh leaves, and rendered the scenery of a lively light-green appearance. Looking northwards from the heights we reached, we saw an endless succession of high hills, chiefly of the conical form. This district may be called the beginning of the really healthy region. We slept for a fortnight in the open air, and seldom put on a blanket till towards morning; nor did we use quinine: yet all returned in good health, and have remained so.

We have ascertained nothing to invalidate the opinion which I have expressed, that the highlands beyond this are healthy, and fit for the residence of Europeans. The only ailments the party has been subject to, with the exception of one slight sun-stroke, have been colds, modified by the malaria to which we were exposed in the Delta. Dr. Kirk and I have enjoyed uninterrupted good health. The only cases of real fever we have seen have been among the Kroomen, and, as far as our experience goes at present, Europeans are more likely to be safe and useful than Kroomen.

The geologist reports having found three fine beds of coal; the first 7 feet thick, the second 13 feet 6 inches, and the third 25 feet in thickness. They are all in cliff sections, and the last was fired a few years ago by lightning, and burned a long time. I have already reported on its good quality, though obtained only from the surface. Mr. Thornton will run a shaft some distance in order to ascertain its quality there. There are immense quantities of the finest iron-ore in the same district.

I was not aware that sugar was manufactured by the natives till lately, but I bought six pots of it, at the rate of two yards of calico for twenty pounds.. This is only the beginning of the fine country, and I naturally feel anxious that my companions

should have an opportunity of verifying my statements respecting both its productions and people. As for the inhabitants near the Portuguese, I almost despair of doing anything with them. My hopes are in my own countrymen and the natives of the central regions.

I fear it may be considered irregular to send sketches along with despatches, but I thought this the best way of conveying a clear idea of my meaning. The photographs require varnishing and mounting for the stereoscope; one showing a dead hippopotamus, while also exhibiting the rocks in the river, will be interesting to Professor Owen, on account of a rupture in the perinæum, nearly healed when the animal was shot. Another photograph exhibits the channel among the rocks. The extreme heat of the climate presents many difficulties to the operator, but should it be found that they can be transmitted uninjured, aid may be rendered to the science of ethnology, &c.

I beg leave to call your Lordship's attention to the tracings of the Zambesi, above Tette, by Dr. Kirk, as presenting, without the accuracy of a regular survey, a very fair idea of the river in that part of its course. A tracing of the Zambesi from Senna to Tette accompanies the sketches of Mr. Baines. It was made when the river was at its lowest, and is of the broadest part where the second banks make most show. To my eye the water, though often extremely shallow, made more figure than it has done in the eye of the artist. Mr. Baines's view of it is, therefore, probably the most correct, and it may be considered as the river at its very lowest ebb. I came up in the same month (November) when the *Launch* was drawing 2 feet 6 inches, and was obliged to drag her by main force through four places of almost 50 yards, containing from 18 inches to 2 feet of water.

No. 2.

February 14th, 1859.

MY LORD,—Referring to the intention expressed in my former despatch, of visiting the rapid, Kabrabasa, as soon as the Zambesi came into flood, I left orders for Mr. Charles Livingstone and Mr. Baines to perform that service as soon as the river had risen 12 feet, and, with Dr. Kirk in company, departed from Tette in order to explore the Shiré—a branch of the Zambesi which, as far as we could ascertain, had never been examined by Europeans farther than 20 or 30 miles from the confluence. The water in the Revubue having begun to rise, we ascended this stream the same day we left the Tette to within a few hundred yards of the seams of coal already reported, and thereby proved that, during many months of

the year, little difficulty would be experienced in the transport of the mineral in flat-bottomed boats. But without steam power I do not think that the mines can be of any value to the Portuguese; slave-labour is so very expensive and canoe-navigation so tedious, though the coal in vast amount lies on the surface and close to the water's edge, they cannot enter into competition with the free skilled labour of England. As long as their present system lasts, Newcastle coals may be placed at the port of the Kongone cheaper than those of the Revubue.

Leaving the coal-field on the 21st December, 1858, we reached Senna in three days, and thence proceeded up the Shiré. We have always been on amicable terms with the people lately at war with the Portuguese, and met therefore with no opposition. We found the river admirably adapted for steam-navigation: it is deep, and contains none of the sand-banks which render the course in sailing on the Zambesi so generally tortuous. Presuming that it might be agreeable to your Lordship to receive the remarks of another observer, I have requested Dr. Kirk to furnish a report of the trip, and will only add, that while the inhabitants showed strong suspicions of our being men-stealers, it did not prevent them from indulging their passion for barter. They had plenty of cotton for their own use, and seemed to be agricultural in their habits. In the presents we gave we tried to avoid imparting the idea that we thereby paid for "leave to pass." The diffusion of this idea around the Portuguese settlements has been a great barrier to the spread of their commerce. The information we received leads us to conclude that the Shiré actually does flow from Lake Nyánja; but seeing the suspicions the first visit of Europeans had awakened, we thought that it would be hazardous to leave the vessel before we had secured the confidence of the natives. This we hope to effect in the course of another visit.

Our farther progress in the vessel was stopped by the cataract Mamvera. Five days beyond this the river is reported to be smooth, and navigated by Arabs from Zanzibar in canoes. We wish to be allowed to name the falls after Sir Roderick Murchison, and a high mountain, whose native name is Manguru, after Lord Clarendon, in kind remembrance of the interest he took in the expedition when in office. The advantage of having an English name as well as the native one is to perpetuate the nationality of the discovery, and the point when the native name has changed.

We returned to Tette on the 2nd current. The Zambesi being now about 12 feet above low-water mark in November, it was difficult to recognise it as the same river. It is truly what Captain Gordon called a "more like an inland sea than a river," and exhibits none of those sand-banks to the view which, in trying to

depict it at its lowest ebb, we have marked in the tracings sent home.

On the day after our arrival here Messrs. Livingstone and Baines returned from Kabrabasa: their reports coincide exactly with what I stated in No. 12 as to the effect of a rise of the river on the rapid. It thoroughly obliterates formidable cataracts; but a vessel of good steam-power is necessary to stem the current in the middle and resist the suction of the eddies. On hearing that the rapid was so much changed that, but for the mountains which had been sketched, the situations of the cataracts would not have been known, I felt strongly inclined to attempt hauling the vessel up; but she can carry no cargo, and, besides the risk of her breaking up in the attempt, we should very soon be destitute of supplies after we had succeeded.

My Makololo, who may now almost be considered part of the expedition, on learning our intention to remain till we knew if Her Majesty's Government would send a vessel capable of taking us all up the country in November or December next, came forward and proposed that I should give Mr. C. Livingstone to lead a party of them back to their own country. This seemed so reasonable, it was at once acceded to; but while Mr. Livingstone was preparing for the journey an afterthought changed their plan, for, recollecting that their chief had ordered them to return with me, "they feared that having left me here might be construed into disobedience." I mention this to show that in all their conduct since they have been associated with me they have been actuated by intelligent motives. I regret that I did not feel at liberty to lead them back myself till I had received your Lordship's decision about another vessel.

This is the most unhealthy season of the year: fever now prevails and is very fatal near the coast. Mr. C. Livingstone, Mr. Baines, and Mr. Thornton have had touches of the complaint; but all move about again. It is seldom fatal at Tette, though many are attacked. Dr. Kirk and I have never had anything but good health since we came into Africa. When the unhealthy time is past we propose working in the Shiré and Manica.

No. 3.

May 12th, 1859.

MY LORD,—In accordance with the intention expressed of revisiting the River Shiré as soon as the alarm created by our first visit had subsided, I have the pleasure of reporting to your Lordship that, having found the people this time all friendly, we left the vessel in

charge of the quartermaster and stoker, with a chief named Chibisa (latitude $16^{\circ} 2'$ s. longitude 35° E.), and, with Dr. Kirk and thirteen Makololo, advanced on foot till we had discovered a magnificent inland lake, called Shirwa. It has no known outlet, but appears particularly interesting from a report of the natives on its banks, that it is separated from Lake Nyinyesi (probably the Nyassa, Nyanja, or Unyamwezi, which is believed to extend pretty well up to the equator,) by a tongue of land only five or six miles broad; and, as we ascertained, the southern end of Shirwa is not more than 30 miles distant from a branch of the navigable Shiré.

The course pursued was chiefly north and along the banks of the Shiré. We were in a mountainous country, and the observations of the aneroid barometer, registered by Dr. Kirk, show that we daily gained some hundreds of feet of elevation. The river, besides rushing over several cataracts, has generally a current as rapid as a mill-race. About latitude $15^{\circ} 30'$ s. it is about 30 yards wide, and the channel, though deep, being but little depressed below the level of the banks, it gave the idea of water-power, without dams, sufficient to drive all the mills in England. Our route was much more tortuous than the river, because we were obliged to go from one head-man's village to another, and much delay was occasioned by the formalities necessary to convince every little great man that we were not a company of marauders. Chibisa was the only man who did not feel it incumbent on him to collect all his people together before giving us an audience; but he possesses a firm belief in his own inherent dignity. He told us that his father had imparted an influence to him, "whereby all who heard him speak feared his words." He spoke of it "having entered by his head," as one would a fact in natural history, and we found that he really did possess considerable influence in the country northwards, from which traditionally his family emigrated. The weight of his name, by means of a man whom he sent with us, was of essential benefit. Our progress was, however, slow, for, after a fortnight's journey from the ship, we were not more than 40 miles distant in a straight line. We had come near a lofty mountain, called Dzomba, or Zomba, and on crossing a spur of it on the south, we first got a distant view of a part of Lake Shirwa, at the foot of a range of high mountains in the east. We had traced the Shiré up to the northern end of Zomba, but were prevented by a marsh from following it further on that side. Coming round the southern flank of the mountain, on the 14th April, we saw the lake, and were then informed that the river we had left so near it had no connexion with Lake Shirwa. We then proceeded eastwards, and on the 18th April reached its shores: a goodly sight it was to see, for it is surrounded by lofty mountains, and its broad blue waters, with waves dashing on some parts of its shore, look like an arm of the

sea. The natives know of no outlet. We saw a good many streams flowing into it, for the adjacent country is well watered: several rivulets which we crossed unite and form the Talombe and Sombane, which flow into the lake from the south-west. The water of the Shirwa has a bitter taste, but is drinkable. Fish abound, and so do alligators and hippopotami. When the southerly winds blow strongly, the water is said to retire sufficiently from that side to enable the people to catch fish in weirs planted there.

The lake is of a pear-shape, only the narrow portion is prolonged some 30 miles south of the body where we stood. There is an inhabited mountain-island near the beginning of the narrow part: the broad portion may be from 25 to 30 miles wide. We ascended some way up the mountain Pirimiti, and, looking away to the N.N.E., we had 26° of watery horizon, with two mountain-tops, rising in the blue distance like little islands 50 or 60 miles away. The natives use large canoes, for fear of storms on it, and reckon it four days' paddling in a calm to reach the end; but with a strong wind they can do it in two days. Until it is surveyed, it will not be over-estimated at 60 or 70 miles in length. This does not include the southern narrow portion of 30 miles.

The height of the lake above Chibisa Island, where we left the ship, was 1800 feet, or in round numbers 2000 feet above the level of the sea. Mount Zomba is over 6000 feet high. In crossing its southern spur we were 3400 feet above the ship, and the great mass of the mountain rose on our left, apparently of greater altitude than Morambala, which, by ascending, we ascertained to be 4000 feet high. It is inhabited, and we could see cultivated patches from below. To a spectator in the far north it will appear as if standing in the lake. It is not actually on its shores, but it separates the valleys of the Shiré and Shirwa; and, as the natives report the Shirwa to be separated from a much larger lake, Nyinyesi, by a strip of comparatively level land, which would scarcely be taken into account by Arab traders in their descriptions, we see the general correctness, so far, of the information collected by the Rev. Mr. Erhardt, of the Church Missionary Society, on the east coast. Nyinyesi is also known as the "Great Nyanja;" but this word, being applied to any collection of water, and even to rivers, as the Shiré, Nyinyesi — "the Stars," seems preferable.

The whole region was well, though not densely, peopled with Mang-anja, who inhabit both banks of the River Shiré from Morambala up to Chibisa's place; but they occupy the eastern bank only and the adjacent mountains beyond that point. The western bank above Chibisa is peopled by the Maravi. None of this tribe are to be met with near Shirwa, so it would appear to be improper to identify it with the "Lake Maravi" of the maps; nor can we set it down as that concerning which I collected some information


from *Señhor Candido*, of Tette, for it was described as 45 days to the N.N.W. of that village. The Portuguese do not even pretend to know Shirwa. It is necessary to state this, because, after the first European had traversed the African continent,* the Portuguese Minister claimed the honour for two black men (*feirantes quotas, trading blacks* according to the History of Angola and Pombeiros = trading persons of colour according to the Portuguese Archives †), and these *blacks*, in the memory of a lady now living at Tette, came thither dressed and armed as the people of Londa, but proceeded no farther. They thus failed by about 400 miles of what was claimed for them; and now, as Lake Shirwa is found to stretch some 40 miles on each side of the latitude of Mozambique, and they neither crossed nor came near it, the inference is obvious. We made frequent inquiries among the people if they had ever been visited by white men before, and we were invariably answered in the negative. A black woolly-haired slave-trader once visited the part; but the discovery is not spoken of in reference to such, the lake being surrounded by them, but it is claimed for Dr. Kirk and myself, as Europeans who accomplished it, entirely ignorant of any information that may or may not be locked up in Portuguese archives.

Our friends the Portuguese do not enter the River Shiré: the Manganja are brave, and repelled an expedition sent in former times before it had gone 30 miles. Traders are afraid to go, as some native ones have been plundered; but we have gone about 150 miles without once coming into collision. The Maganja cultivate the soil very extensively, and more men than women were sometimes seen at this occupation. The soil is very rich: the grass, generally from 6 to 8 feet high, overhangs the paths, which, from being only about a foot wide, there is a perpetual pattering on the face in walking. A few yards often hides a companion completely, and guides are always necessary, it being impossible to see, on entering a path, where it leads. Even the hills, though very steep and stony, are remarkably fertile. Gardens are common high up their sides and on their tops: they present a pleasant diversity of light and shade in the general dark green colour of the trees, with which nearly all are covered. Cotton is cultivated largely, and the farther we went the crop appeared to be of the greater importance. The women alone are well clothed with the produce, the men being content with goat-skins and a cloth made of bark of certain trees. Every one spins and weaves cotton: even chiefs may be seen with the spindle and bag, which serves as a distaff. The process of manufacture is the most rude and tedious that can be conceived:

* Blue-Book for 1837.

† Examined by Bowdich, to whom the Portuguese minister refers.

the cotton goes through five processes with the fingers before it comes to the loom. Time is of no value. They possess two varieties of the plant. One, indigenous, yields cotton more like wool than that of other countries: it is strong, and feels rough in the hand. The other variety is from imported seed, yielding a cotton that renders it unnecessary to furnish the people with American seed. A point in its culture worth noticing is, the time of planting has been selected so that the plants remain in the ground during winter, and five months or so after sowing they come to maturity before the rains begin, or insects come forth to damage the crop.

The Manganja have no domestic animals except sheep, goats, fowls, and dogs. Provisions are abundant, and at a cheap rate. They have no ivory, and few wild animals are seen; but they assert that elephants and large game abound among the Maravi, west of the Shiré. Their weapons are large bows and poisoned arrows with iron heads. Every one carries a knife, and almost every village has a furnace for smelting black magnetic iron-ore. Spears are rarely seen, but are very well made and of excellent iron. Fire-arms have not been introduced; but a rude imitation of a pistol has been made by a people N.W. of them in a country called Siria, and it is used with powder only on occasions of mourning. They were not aware that it could propel a ball. It cannot be classed with arms, but with the apparatus of the undertaker. They think that making a noise at funerals is the proper way of expressing grief. The bodies of both sexes are tattooed in straight raised lines, radiating from various points, and all file their front teeth with stones, so as to leave them of a semi-lunar shape .

The women perforate the upper lip close to the nose, and enlarge the orifice till they can insert a ring of ivory or tin of from one to two inches in diameter. Some ladies of fashion have the upper lip so drawn out as to admit of a ring, which, with the outer edge of the lip, hangs below the chin, and the mouth and under lip appear through the upper. All were timid. Men whom we met unexpectedly in the long grass threw down their burdens and ran away. It is probable that our dress and colour are as uncouth to them as their nakedness and lip-rings are to us. When we entered a village the women rushed into their huts and shut the doors in terror, and even the fowls would take to wing and leave their chickens in dismay.

When at Lake Shirwa, the people pointed out a pass in the mountain-range Milanje, through which a tribe, called Anguru, come to attack them with guns. We came close to a large party of Bajana or Ajana slave-traders, who were in the habit of carrying their captives to Quilimane. They persuaded the Manganja to mislead us, so that we did not see them. Some of the women told

the Makololo that the Bajana said the English would stop their trade, and no more foreign cloth be brought into the country. The chiefs tried to justify their co-operation in the traffic by asserting that none but criminals were sold. No impudence was shown to us except by another party of Bajana slave-traders, and their deportment was instantly changed on learning that we were not Portuguese, but English.

In returning to the ship, we went down the Shirwa valley, leaving the Shiré valley on the west: the narrow part of the lake and the lofty mountains of the Milanje range were on our left. This has a comparatively flat top, and is inhabited; but another mountain mass more to the north, of equal if not greater altitude than Zomba, is so abrupt and jagged as to appear quite inaccessible. No other mountain looked sterile. All are covered with grass and trees, and are very beautiful. The general vegetation of this elevated region in which we were travelling was like that of Londa, in the middle of the continent, and like it, too, there are many bogs and flowing streams. The people cultivate the manioc largely, like the Balonda; but we could not ascertain that their religious sentiments were identical. We saw many old people, and the country being so high, we believe it to be healthy. It was considerably cooler than the part of the Shiré to which we descended. We slept twenty nights in the open air and on the ground, and got our clothes wet with the dew every morning from the high grass overhanging the paths, yet returned from our march of twenty-two days in good health to the ship.

We found that Quartermaster Walker had been suffering from fever ever since we left the ship, but recovered soon after the proper remedies were applied. I take this opportunity to state that Messrs. Livingstone, Thornton, Rae, and Baünes have suffered frequently from this complaint during the last few months: the attacks, however, were so modified by our being well provided for, that we did not recognise the disease as identical with that from which, when destitute of every comfort, I suffered so much myself. The majority of the attacks have greatly resembled common colds. Their frequent return with the very same symptoms in the same individual, and these more intense in the unhealthy season, led us at last to conclude that we had been dealing with fever. My own ideas and those of Dr. Kirk are completely modified as to what fever is by our late experience. We believed that we had entirely escaped the African fever, but now consider that all the "common colds" have been modifications of the disease: what is of more importance, we can cure it readily, and, taken early, in a very short time. Dr. Kirk and I have enjoyed excellent health ever since we came to the country, though we have been more exposed to malaria than the

others. In navigating the vessel, I have been constantly in the sun without injury.

In coming out of the valley of the Shirwa, we crossed a plateau between it and the Shiré valley of between 3000 and 4000 feet. There we got a glimpse of the end of the lake in the south, and an opening in mountains near the southern end of Milanje seemed to open out a part of the Shiré marsh, where we found so many elephants. We descended as before mentioned, and thence sailed down (to $16^{\circ} 30'$ s. lat.) to a branch of the Shiré called the Ruo. This we ascended in the steamer 7 or 8 miles to a cataract called Pakampinga, and found that by this route we were not much more than 30 miles distant from Lake Shirwa.* The chief at the cataract, called Mororo, seemed quite friendly, and perhaps it may be possible to carry a whale-boat over the intervening land between the Ruo and Shirwa, and thence to explore Lake Nyinyesi. Some time must elapse before a vessel capable of stemming the Kabraba Rapids can arrive, and we hope that our service in the discovery of Lake Shirwa, and the proposed employment of the next few months, before gaining the sphere of our more permanent operations, may meet with your Lordship's approbation.

P.S. We have received no news from England during the last twelve months. We made inquiry at Lake Shirwa whether Captain Burton's party had reached Lake Nyngesi, but could learn nothing about him. If we should find that he has already explored that lake, it may modify our plans. Supposing him to have succeeded, we may claim the discovery of a lake, and a short route to him. We proceed from this to the mouth of the Kongone, in hopes of meeting a man-of-war with salt provisions, on the 24th May, and thence to Tette to embark Mr. C. Livingstone to make magnetical observations in the new region. He was left at Tette with orders to explore the gold-producing country to the south-west; but irruptions of the Caffres, called Landeens, in that direction, prevented his accomplishing that service. The geologist has been working at the coal near Tette.

July 26, 1859.

ENCLOSURE No. 2 contains a report on the navigation of the Zambesi, and as that subject has been discussed before the Royal Geographical Society and curious assertions made on the ground of a mere theory, as that "wheat cannot grow in certain latitudes at the level of the sea," while we have it flourishing before our eyes, and that cotton (which my brother, Mr. C. Livingstone, who understands the subject, pronounces to be so good as not to require the seed to be introduced from America) "is not fit for the mills of Manchester," it may be well to submit this Report to that Society.

* Difference of altitude, probably 2000 feet.

Report on the Navigation of the Zambesi. By DR. DAVID LIVINGSTONE, M.D., F.R.G.S., &c., H. M. Consul in Central Africa.

IN endeavouring to form an estimate of the value of the Zambesi for commercial purposes, it is necessary to recollect that we were obliged in the first instance to trust to the opinions of naval officers who had visited it, and the late Captain Parker, together with Lieutenant Hoskins, having declared that it was quite capable of being used for commerce, though the Portuguese never did, and do not now enter it directly from the sea, we trusted in the testimony of our countrymen, and though we failed to find a passage in by Parker's Luabo, we discovered a safe entrance by the Urande Kongone; and H. M. S. *Lynx*, Captain Berkely, at a subsequent period, found a good channel by the main stream (Parker's Luabo) though we had failed to observe it in a three days' search. The question of safe entrance from the sea having thus been satisfactorily solved, our attention was next directed to the rest of the river, the subject of this report. It is desirable also to remember that, in an experimental expedition like ours, it was plainly an imperative duty to select the most healthy period of the year, in order to avoid the fate of the Great Niger Expedition. Had we come at any time between January and April, a large vessel could have been taken up as far as Tette, but that is the most unhealthy time of the year, and we then looked on the African fever as a much more formidable disease than we do now. We entered the river in June, when it was falling fast, but even then the official reports of Captain Gordon and other naval officers were precisely the same as those of Captain Parker and Lieutenant Hoskins. Their testimony, however, referred to only about 70 miles from the sea, Mazaro, the point at which the Portuguese use of the river begins. We have now enjoyed a twelvemonth's experience, which is the shortest period in which all the changes that occur annually can be noted, and we have carefully examined the whole, from the sea to Tette, five times over, in a craft the top-speed of which ($3\frac{1}{2}$ knots) admitted of nothing being done in a hurry, and may therefore be considered in a position to give an opinion of equal value to that of flying visitors, better qualified in all other respects for the task. As a report on the river would be incomplete without a description of it when at its lowest, I sent the journal of Mr. T. Baines to the Society, which was written at the worst part of the river, and in a season said by all to be one of unusual drought. Mr. Baines was taken up by a southern channel, which contained much less water than that which we ascended a month later; but adopting that journal as showing what the river may

again become in a season of drought, I would only add that in passing from the sea to Tette, when the river had fallen still lower than at the period when the journal was penned, we were obliged to drag the vessel over three crossings, 100 or 150 feet long, of from 24 to 18 inches of water. It is not, however, to be understood that such is then the general depth. In the broad parts of the river we have three or four channels, and the greater part of these channels contains water from 8 to 15 feet deep, even when the river has reached its lowest ebb. But we are often obliged to cross from one channel to another, and sometimes from one bank to the other; and it is in these crossings that the difficulties occur. I am not aware that anything has been written on the form of the bottoms of rivers, but familiarity with that and the signs on the surface will enable one man to find three fathoms, while another will run aground in one or two feet. From our experience of a year in which the river was unusually low, and the rise deferred to a later than ordinary period, it is certain that a vessel really of 18 inches or 2 feet draught could ply at all seasons on the first 300 miles of the Zambesi.

At my suggestion, a tide-pole was planted at Tette by Major Sicard, and the lowest point the river reached in November, 1858 (that in which 18 inches were found in a few crossings), adopted as the low-water mark. By careful measurement with the theodolite, the river was found at that point to be (964) nine hundred and sixty-four yards from bank to bank, which, if I remember rightly, is more than twice the width of the Thames at London Bridge. At its lowest ebb it contained between 300 and 400 yards of water of various depths. The deep channel of this, in which the vessel lay, from 12 to 15 feet deep. As it enables one to form a clear idea on the subject, I may mention that we lost an anchor there when the water rose, and, the volume of water being always considerable, we have no hope of getting it again by being left high and dry as a certain ship is represented at her anchorage in the Niger. At Shiramba Dembe the river is 3490 yards wide, or $1\frac{1}{4}$ geographical mile nearly. At Shigogo it is broader, probably 3 miles, but large islands divide it into five or six channels. It is evident that with such an amount of spread, if the current of the Zambesi were very rapid, a rise of several feet at Tette would be of comparatively small value at Shigogo. We, therefore, took the precaution of marking a perpendicular rock at the east end of Lupata, adopting as at Tette the top of 18 inches at the crossings as low-water mark, and carefully measured the velocity of the stream at the most rapid parts we knew. The result obtained both by patent and common logs was that no part of the river below Kabrabasa has a current of 4 knots. We were particularly suspicious as to the correctness of this result, as some of our naval

friends, judging from sight only, spoke of 6, and even 8 knots, but re-measuring the common log and observing the patent log hour after hour, in parts that this vessel could barely stem, showed no more than $3\frac{1}{4}$ knots. The general current is $2\frac{1}{4}$ knots and under: the heights of the river, observed by Major Sicard and by ourselves at Lupata and elsewhere, may therefore be considered as applicable to the whole stream. The amount of fall noticed also in the table, being only once down to $7\frac{1}{2}$ feet, shows that the character of mountain-torrent cannot be applied to the noble Zambesi any more than it can be to the Nile.

From November to January the river rose gradually to 8 feet above low-water mark. From the 15th of January to the 15th of May it had depth enough for a large vessel, though Major Sicard remarks that this year it attained only a minimum height: and the accuracy of this is confirmed by the fact that only a small quantity of wheat is sown, the parts flooded by the river being the parts employed for the crop. The data now submitted appear to prove that a vessel of 2 feet draught, such as are necessary for the Mississippi, could run the whole of ordinary years. We know of no other observations on which the navigability or non-navigability of the river can be pronounced upon, but leave them for the consideration of those better qualified to give an opinion.

We have in the course of one year cut up into small pieces upwards of 150 tons of *lignum vitæ* alone, which, according to the average prices in London during 1858, was worth about 900*l*. This wood, when dry, was, in the absence of coal, the only fuel with which we could get up steam, owing to the boiler-tubes being singularly placed all on one side and chiefly below the level of the fire, from which novel arrangement one side remains long cold while the other is hot, like a patient in the palsy; and four and a half or five mortal hours of fuel-burning are required to get up steam; yet by incessant labour and a dogged determination to extract all the good possible out of an engine probably intended to grind coffee in a shop-window, we have traversed 2350 miles of river. Now, had we been permitted to show what could be effected in this one branch of commerce, it is not unreasonable to say that every time the saw went through *lignum vitæ* it might have been to secure or dress a log. Without any great labour we might have cut a thousand instead of one hundred and fifty tons of that valuable wood, and given a practical exposition of what may, and very probably soon will be effected by the Germans in Zambesi commerce.

The only paper that reached us up to the middle of June last contained a short notice of the meeting of the Royal Geographical Society, in which some interesting assertions were made in connection with a pretty theory and an engineering plan, that the

Zambesi, which, under the very serious disadvantages of that plan, we have actually been navigating, was not navigable at all. If our fellow-members will only believe that we have a merry smile on our faces, we would venture to move, for the support of the theory, in parliamentary fashion, that the word *ought* be inserted thus: "Wheat *ought* not to grow at the level of the sea;" "indigo *ought* not to grow more than a foot high," and "it *ought* not to contain indigo at all." "The seeds of cucumbers and water-melons *ought* not to contain a fine bland oil, fit for the purposes of the table," because that would be like "extracting sunbeams from cucumbers." "The Zambesi *ought* not to be navigable for commercial purposes," and the Steam Launch "Asthmatic" "*ought* to have been intended to draw" something more than merely "grist to the mill."

If there be wind enough to cause a slight purl on the water, any one ascending a river may observe dark blue lines stretching across the stream. These by native pilots are called "Kwétts," and betoken the edge of banks under water. It may be observed also that one bank or other of the river is worn so as to be perpendicular; and that these perpendicular parts alternate from one side to the other at greater or less distances according to the rapidity of the current. The submerged banks are generally of a semilunar form at the lower edge, or part farthest down the stream; and this is invariably the shoalest portion in the whole bank. They lie diagonally to the direction of the river, the angle of direction being less or greater according as the river is high or low. The kwétte is the part immediately below the shoal-edge of the bank, and the importance of knowing them by the blue line and other signs may be judged by the fact that, while in the kwétte you may have from two to three fathoms up to the very edge of the convex mass, *on* it you may not have one foot. The formation of these banks it is difficult to explain without drawings. The water actually rolls over and over sideways towards the part of the bank situated up stream, and there lies the deep channel. The proper course is to curve round in the kwétte till the upper third of the submerged bank is reached, then enter on the bank where you have deep water along towards and in the side which is cut perpendicularly. This, which often is miles in length, is called by the pilots "Kokole." Sometimes the semilunar banks are placed in pairs, and the water between them is very deep; but the furrow of three or four fathoms ends in a triangular shoal. The upper third of one of the banks, on which, in our bright sunshine, a distinct bulge shows the moist water, is to be chosen for getting out of the deep channel before reaching the shoal. My ignorance whether anything has been written on the subject, and desire to wipe out possibly an unmerited reproach

by an American author, the Rev. Mr. Bowen, that our officers were ignorant of the laws which determine the channel of deep water in the Niger, are offered as excuses for venturing these few remarks. If I succeed in inducing the better qualified among your members either to point out what has already been done in describing the bottom of rivers, or in working out the subject which I have but touched on, I shall not have incurred the charge of presumption in vain. In July last year we ran aground perpetually by going straight ahead, while in September, when the river was much lower, Mr. Medlycott of H. M. S. *Lynx*, seemed to know the kwéttés and banks intuitively, and never touched at all.

The submerged sandbanks, as on the Nile, are the greatest difficulty in Zambesi navigation. Each river has its own disadvantages. The Mississippi has its snags, and it is said requires vessels of a peculiar build and only 2 feet draught. The Hoogley has its own very peculiar difficulties of entrance, and so has the landing-place at Madras; but difficulties are not impossibilities. A great difficulty, the African fever, is, we hope, rendered less formidable, and, in spite of the theory that Europeans cannot live and labour in the tropics, we find that hard work, with the good food most conscientiously supplied by Mr. Wilson of Glasgow, and a merry heart, have secured as fair a share of health as we should have had in London.

From October, 1858, to June, 1859, 5782 elephants' tusks have gone down the Zambesi from Tette alone; of these two-thirds were large, or upwards of 50 lbs. each. The weight of the whole was in round numbers 100,000 lbs. All merchandise is carried in large unwieldy canoes, which cost between 60*l.* and 70*l.* each. When loaded they draw about 2 feet and carry 2 tons, at an expense of 10*l.* sterling from Quilimane to Tette, when the river is full. When the small channel between the Zambesi and the Quilimane river is dry, which is the case at least nine months in the year, the expense is much increased by the land-carriage to Mazaro. English manufactured goods come in a roundabout way by Banian or Gentoo traders from Bombay, and they are obliged to give larger prices for ivory than the Americans or Germans, who are absorbing all the trade of Eastern Africa. Several Tette merchants have been waiting at Quilimane for months in expectation of American ships with cottons. For the information of mercantile men it may be added that the American calicoes are coarse, unbleached, yard-wide cottons, costing at Quilimane between 5*d.* and 6*d.* per yard; and muskets, inferior to English trade arms, from 26*s.* to 36*s.* each. With calicoes, guns, and gunpowder, they easily secure all the trade on the east coast below Zanzibar. No attempt is made to encourage the native

taste for better articles, which exists quite as strongly here as on the west coast. Red and blue colours are often unravelled, respun, and rewoven into "country cloths, and towards Lake Shirwa the only scraps of these colours that come into the country are exclusively claimed by the chiefs.

The Right Hon. Lord J. Russell, M.P., &c., Foreign Office.

MY LORD—

October, 13, 1859.

I have the honour to convey the information that we have traced the river Shiré up to its point of departure from the hitherto undiscovered Lake Nyinyesi or Nyassa, and found that there are only 33 miles of cataracts to be passed above this, when the river becomes smooth again, and continues so right into the lake in lat. $14^{\circ} 25' S$. We have opened a cotton and sugar producing country of unknown extent, and while it really seems to afford reasonable prospects of great commercial benefits to our own country, it presents facilities for commanding a large section of the slave-market on the east coast, and offers a fairer hope of its extirpation by lawful commerce than our previous notion of the country led us to anticipate. The matter may appear to your Lordship in somewhat the same light, if the following points in the physical conformation of the country are borne in mind.

There is a channel of about from 5 to 12 feet, at all seasons of the year, from the sea at Kongone harbour up to this cataract, a distance of about 200 miles, and very little labour would be required to construct a common road past the cataracts, as the country there, though rapidly increasing in general elevation, is comparatively flat near the river.

The adjacent region may be easily remembered as arranged in three well-defined terraces. The lowest of these is the valley of the Shiré, which is from 1200 to 1500 feet above the level of the sea, and exactly like the valley of the Nile near Cairo, but beyond the cataracts somewhat broader. The second terrace lies east of this, and is upwards of 2000 feet in altitude, and some 3 or 4 miles broad. A third terrace, still further east, is over 3000 feet high at its western edge, or about the height of Table Mountain at the Cape, which is often mentioned as the most remarkable mountain in that part of Africa. The terrace is 10 or 12 miles broad, and is bounded on the east by Lake Shirwa, or Tamándua, and a range of very lofty mountains. On this last terrace rises Mount Zomba, which, on ascending, we found to be in round numbers 7000 feet high; a mass of the same mountain, 8 or 10 miles distant from our encampment on it, must be at least 8000 feet in altitude.

These features of the country are mentioned in order to show that we have very remarkable varieties of climate within a few miles' distance of each other. We travelled in the hottest season of the year, or that called in Western Africa "the smokes," when, from the burning of tens of thousands of acres of tall grass, the atmosphere takes on a good deal of the appearance of a partial London fog; only here it is broiling hot. While we were marching in the Shiré valley, or lowest terrace, the air was sultry and oppressive, the thermometer in the shade even often standing at 96°, and the water never under a temperature of 81° Fahr., but when we ascended the second terrace, the air became delightfully cool, and every mile or two we crossed a running rill of deliciously cold water. The third terrace was cold, and equally well supplied with running brooks; while on the top of Zomba our native companions complained bitterly of the cold.

The mountain itself is of large extent, and at the part we ascended there is a large valley with a fine stream and much cultivation on the top; several parts of it are well wooded, and Dr. Kirk, the botanist, found pepper growing wild: an indication of a decidedly humid climate. On each of the three terraces cotton is cultivated extensively: this is not of the indigenous variety only, but foreign seeds have come up the Shiré to some parts of the terraces, and also to the lake region, from the east coast. The length of staple to which these imported varieties have attained shows a suitable soil and climate. A good deal of salt is met with in certain soils here; and in all probability sea-land, the dearest of all cottons, would flourish, for specimens of common kinds were found superior to the Egyptian. The indigenous variety feels more like wool than cotton, but foreign seeds were eagerly accepted by the people from Mr. C. Livingstone, and the best means for disarming their suspicions that we might turn out to be a marauding party, was frankly to state that we came to find out and mark paths for our traders to follow and buy their cotton.

Our route was northwards to the Zomba, and then along the valley of the Shiré in the same direction. The land beyond the mountain named, contracts into a narrow isthmus between the two lakes, Shirwa or Tamándua, and Nyingesi, or Nyassa. The entire length of the former is 90 miles; but we could get no information as to how far the latter extended. All that the natives on its banks knew was that it went a long way to the north and then turned round into the sea. We reached it on the 17th of September, but could not proceed with the exploration.

We found a heavy swell on the lake, though there was no wind, and there was no appearance of the water ever falling or rising much from what we saw it. The river Shiré never varies more than 2 or 3 feet from the wet to the dry season, and as it is from 80 to 150 yards broad, 12 feet deep, and has a current of

2½ knots an hour, the body of water which gives it off must be large and have considerable feeders. At its southern end the lake seemed 8 or 10 miles broad, and it trended away to the N.N.W.; a hilly island rose in the distance. It is small, and is called Bazulu. The same range of lofty mountains that lies east of Shirwa, or Tamándua, appeared as if continued along the north-east shore of Nyassa.

But the most important point in the geography is this: the lakes Tamandua and Nyassa lie parallel with the east coast, and all the trade, lawful and unlawful, from the interior to the coast, must cross the Shiré at certain fords in order to get along the narrow isthmus between the lakes without embarking in either. The principal ford is at the point of departure of the Shiré from the lake. There we met a large east coast slaving-party coming from Cazembe's country (in Londa), having an immense number of slaves and elephants' tusks. As soon as they knew that we were English, they made off by night along the isthmus referred to, and, having crossed it, they could diverge to the Angosa River or to Mozambique and other ports on the east coast.

It is highly probable that a small steamer on the Shiré and Lake Nyassa would, through the influence of the English name, prevent slave-parties from passing the fords, and goods could be furnished to the native traders at Lake Nyassa as cheap as they can get them on the east coast, which involves a month's journey farther. By purchasing cotton from the people on the banks of the lakes, and ivory from the traders who annually come past in great numbers from their tribes far in the west, there is a high degree of probability that we could cut up the slave-trade by a high district at its source. We were in the slave-market, and the capabilities of the country for the production of cotton cannot be over-estimated. There are no frosts in any part of the region to endanger or cut off the crops as in America; the people are said by the Portuguese to be of quick apprehension even in a state of slavery. Unlike the Caffres, they have no cattle, but are great agriculturists, both men and women working at the employment, to which they are addicted. There is no large confederation, so far as we could learn; each group of villages is nearly independent of the others, and, though well peopled as compared with the country near the Portuguese, scarcely one-fifth capable of cultivation has been under the hoe. The worst feature we observed in the people was the consumption of large quantities of native beer and Indian hemp. I saw more intoxication in the forty days of our march on foot than I had seen in other parts during sixteen years. It is a sort of silly drunkenness; only one man had reached the fighting stage; and he was cured by one of the Makololo thrusting him aside from the path he wished to obstruct, and giving him a slap in the face.

Our party consisted of Dr. Kirk, Mr. C. Livingstone, Mr. Rae, and 33 Makololo. Presuming that "first impressions" of the country may be more agreeable than the statements of an old traveller who has seen so much of the same fine region far to the west, I enclose a sketch of our late journey by Mr. C. Livingstone, which possesses both accuracy and freshness.

We marched on foot more than 250 miles, and were away from the vessel forty days. We had no difficulties with the natives, though no white man had ever traversed the country before, and we trust that our services will meet with your Lordship's approbation.

Extracts from Letters from Dr. D. Livingstone to Sir Th. Maclear, F.R.G.S.

MY DEAR FRIEND,

Tetté, 19th Dec., 1858.

I can only give you a short note this time, and I hope it will suffice to report progress.

We went up to the rapid of Kabra, or, as it ought to be written, Kabra-basa (cut toil, viz. of paddling), while the water in the Zambesi was at its lowest.

We found no one at first who had ever been beyond the entrance, and no account except that of a number of detached rocks, jutting out of the water across the stream.

Portuguese writers, having been no nearer to the Falls than the Coal, have been as much at a loss about it as we, so much nearer the difficulty, and it has been spoken of by them as an "impediment to navigation," which the uninitiated would never dream of as merely applicable to canoe, *alias* batn-boat navigation. We steamed up four miles past the entrance in this frightfully feeble asthmatic dingy of a steamer, and found, to our surprise, that the difficulty consists of the Zambesi being confined to a narrow bed (a quarter of a mile, say), and then to a still narrower one, in that same bed, or a groove cut out in hard porphyritic and syenitic rock. The breadth is from 30 to 40 to 60 yards broad, the walls rise from about 30 feet to 80 or 100 feet and are generally perpendicular—smooth, water-worn, and full of holes. While steaming up this, the man at the lead constantly called out, "No bottom at 10 fathoms!" During flood the groove is filled, and the bed above, too, makes a clear perpendicular rise of the river of from 80 to 120 feet.

We found that rocky islands divided the water in the groove into two or more channels, and there the current, generally gentle, becomes too rapid for this vessel: it is a barrier to canoe navigation in this way. The heavy canoes, with eight paddles, stem a 4-knot current; that is also the case with ourselves.

Mr. Medlycott, n.s., in trying her without an ounce of cargo, found a stiff breeze held her paddles, though she had about 20 lbs. more steam than her makers allowed.

When the current is too rapid for paddling, the canoe-men tow, or punt it; but towing from a height of 80 feet on slippery rocks, and punting at 60 feet, make them "Kabra-basa"—cut that labour—and carry the goods over the Shidima country to a point where the river is again broad. We left the vessel at the first 4-knot current we met, and examined about thirty miles on foot; and certainly that was the very worst bit of travel I ever went through.

The flood-bed is generally covered with enormous blocks of rock, rounded, and covered with a black glaze. At one part we were travelling at the rate of one mile for three hours—the rocks so hot, the hand could not be held on them an instant.

The natives declared that the cataract of which we were in search had never been approached by "elephant or hippopotamus; not even an alligator had

ever gone near it, and a man might perish of thirst in sight of it, but unable to descend to it." This refers to the high perpendicular walls on each side, along which no towing line could be carried, supposing we attempted to go up by mere force of hauling. The cataract was impassable at low water, as the angle the water comes down at is about 30° , but the water in flood rises clear 80 feet, and no broken water is then visible.

We saw another cataract of 5 feet fall become level by a 3 feet rise of river. I have not the smallest doubt but a steamer of good power would pass up easily in flood; but we cannot venture to tow this, as she was but one-sixteenth of an inch thick when new, and would crumple up like an old kettle in a rapid.

Dr. Kirk and I, with four Makololo, went up to the worst or unapproachable rapid, called "Morumbaa." Our companions were most willing fellows; but at last gave in, showing their horny soles blistered, and the blisters broken. Our good strong boots were quite worn through: a pair of "powries" (none-such) went as the others, though in ordinary travelling there was no wearing them down. On still urging the Makololo to another effort, they said that "they always believed I had a heart, till then; I had surely become insane, and they were sorry Kirk could not understand them, for if he could he would go back with them." A fortnight and thirty miles made us all lean and haggard, as if recovering from severe illness. Had I come by this way in 1856, I should never have reached Tetté. I do not attempt to describe the rocks, broken, twisted, huddled about in the wildest manner and confusion, over which we struggled: it is impossible. But this region, with its lofty healthy mountains, will yet become famous for tourists. We climbed over mountains 2000 or 2300 feet high, and cut our way through the tangled forest that covers them. I once thought highly of field-geography, and despised that of the easy chair; but I gave in now. Commend me to travelling with a pair of compasses or seven-league boots, with any regard to the slight obstacles which Nature has interposed. Easy-chair geography will do for all the easy-going people, and is often believed in by even the public; but you need not suppose I have been going the length of making no observations, though I cannot send you any on this occasion; no time to transcribe.

We had small-pox at Tetté. I tried inoculation of a heifer to get the vaccine virus; but it did not take—perhaps from the great heat of the weather. I read some experiments of a Mr. Ceeby on the subject, but have forgotten how the thing was managed. By next ship please send me vaccine virus, in capillary glass tubes. We are all well, thanks to our Almighty Protector.

Affectionately yours,

DAVID LIVINGSTONE.

N.B.—I have applied for a steamer of sufficient power. If they don't give it, I have ordered one at my own cost. I won't stick.

MY DEAR FRIEND,

Morumbala, January 13, 1859.

We are returning from a trip up the *Shiré*, and have been so unfortunate as not to be able to tell where we have been; we could not get a latitude, even though we spent nine days in the ascent, and waited three for the appearance of the stars, but we got nothing but clouds and rain. By D. R. we went 120 or 130 miles in a northern direction from this,* and found the river far more navigable than the Zambezi. It is narrow, from 80 to 150 yards, but nearly all deep, and the current uniform; it flows through a great valley 20 or 30 miles wide, bounded by mountains, the lower part very marshy, and inhabited by real *Lotophagi*; the farther we went the more populous it

* Northern end of Morumbala is in $17^{\circ} 24'$ s., and the *Shiré* flows on the w. side, not on the e., as on my map. In the rough map I made it is right.

became. People (Manganja) brought lots of cotton-yarn for sale, but were very suspicious, and kept a guard over us both night and day. They had never been visited before by any white person, nor, so far as we could learn, by any one except Arabs from Lake Nyanja. If their information can be depended on, this river really comes out of that lake, and we were five days from a point navigable up into that mass of water. A cataract prevented our going farther, and, as the space in front was mountainous—the people, besides, being so suspicious—we could not, with any degree of safety, have left the launch; we shall let our (though we say it ourselves) decently good behaviour have its effect, and possibly may return; but where have we been? I need not tell you the result of my attempt at calculating it, but give you the data as follows (for latitude):—

Cataract, Mamvera, January 9, 1859.

(Here follow sets of alts. of ☉, from which the lat. and local time may be obtained.)

Clouds during the remainder of the day; no stars at night.

(Here he enters other sets on the following day.)

Clouds; no stars visible that evening, though we watched the whole night; returned southwards next morning.

The watch was compared with standard at Tetté before starting, and sights will be taken at Shupanga and Senna, if clouds permit.

The top of Morumbala is inhabited, and about 4000 feet high; a fine climate, with running rills of water; orange and lemon trees wild in the woods, also pine-apples; vegetation very similar to that of Louisa; a glorious sanatorium it would be; a hot fountain at the bottom, 174° , slightly sulphurous; at 100 yards from the eye it is batheable, if you have not been using a certain cosmetic to improve your complexion.

Skin-diseases are as common among these Portuguese as red noses are among the beer and port drinking English, but no use has ever been made of the fountain.

The latitude referred to as taken at northern end of Morumbala, was October 16, 1858, m. alt. of a Gravis $119^{\circ} 33' 30''$; no index error; it was taken on bank of river, about $\frac{1}{4}$ mile west of the highest part at the end. The chain or long mountain lies nearly north and south. I could not take a lunar,—the mosquitoes were terrible; we went up the Zambesi to Tetté, but at the entrance of Lupata, at Bandari Rock, we remained a day, and, as the Zambesi is reported to have been beyond all precedent low this year, we were able to accomplish the voyage with a vessel drawing $2\frac{1}{2}$ feet water; we measured a base along the shore of 900 feet, and then took the angles.

The mean of both line of soundings was 3 fathoms, and the current 1 knot an hour (guessed at). What is the quantity of water flowing along the Zambesi at its lowest, as compared with any other river you may remember? It was fordable at a great many places; if the *Pearl* came now she would ascend to Tetté at once, though it is not half full yet; we have seen it at its worst. After reaching Tetté we made all haste to examine Kabrabasa, while still able to do so in very low water. I have given you some account of that, and now give you a few observations.

River Zambesi at Bandari Rock.



Dotted line marks the soundings.

Nov. 9, 1858, entrance to Kabrabasa.

Merid. alt. α Andromeda $91^{\circ} 48' 10''$ (= lat. $15^{\circ} 47' 51''$ s.) -Antares and γ 's nearest limb $22^{\circ} 48' 40''$, at 4 45 7.8 -Saturn and γ 's furthest limb $26^{\circ} 35' 22''$, " 4 54 59.2

Alt. of Venus for time .. 43 43 32 " 5 8 24.5 - I. E. 0.0.

All the times have been taken with the O. T. watch, and the comparisons will be sent of it and the standards.

I enclose a tracing. Watch must have met with an accident; it was losing 3 m. daily when I came here.

Zambesi now 15 feet above low-water mark.

Returning from this first trip to Kabrabasa we had the following at Tetté:—
Nov. 17, 1858, m. alt. Rigel $73^{\circ} 14' 2''$ at 7 h. 30 m. 2.3 s.; m. alt. Procyon $37^{\circ} 30' 8''$ at 7 h. 38 m. 51.9 s. I. E. 0' 00'' - each mean of 5 - Obs.

Tetté, February 16, 1859.

The point measured at Bandari had now 6 fathoms all across, and the current about 2 knots. Kabrabasa had been visited again by Mr. C. Livingstone and Mr. Baines, and the cataracts were obliterated by a rise of about 12 feet; we have no doubt but a steamer of sufficient power would go up when the river is in flood, so we want to see if her Majesty's Government will send us out a gun-boat or something else. This is the most unhealthy period of the year; many are ill, but here people scarcely ever die of fever: three of our party have suffered, but move about again. I have escaped, thanks to our Protector, and so has Dr. Kirk.

When we move, we go up "*Shiré*" and to Manica; we have plenty of work here below, but on receiving the report on Kabrabasa, and that they could scarcely recognise the situation of the Cataract, I felt strongly inclined to try and haul the boat up, but she is so thin, I fear she would collapse, and even after we might have succeeded, as she can carry no cargo, we would soon be out of supplies.

July 31, 1859.

The first part marked private and confidential I have enclosed (on second thought I send a copy); the second contains the details of an occultation as follows:—

Residencia, July 5, 1859.

Obs. alt. Antares .. $101^{\circ} 25' 12''$ at 4 12 25.68 - (mean of 5).

Obs. alt. β .. $105^{\circ} 27' 22''$ " 4 17 48.56 - ditto.

Index error $20''$ additive.

* γ Leonis then appeared by *inverted telescope* to the right and in front of the moon's dark limb, and two stars appeared right in front of it, thus:—



* No. 3. = *Leonis*.

* No. 1.

* No. 2.

Masses of curly clouds covered the sky so as to allow the stars to be seen only in snatches. I lost No. 1, but got No. 2 within a second or two, a patch of cloud preventing my actually seeing the moment of contact. It was 4 h. 58 m. 34 s., and might be 32 s. or 33 s. the instant of disappearance. I then took the following alts. of the moon's L. Limb:—

β $86^{\circ} 18' 30''$ at 5 h. 1 m. 24.67 s. (mean of 3), and not quite so good as Antares or first set of moon, as it was cloudy. Then the instant of disappearance of No. 3, γ Leonis, was 5 h. 8 m. 46 s. This is good, only the star was rather on the side of the moon.

Obs. alt. β $81^{\circ} 44' 30''$, at 5 h. 11 m. 34.48 s. (mean of 5) good, with clear sky. Chronometer employed was *E*, which we now use as a hack; *O. T.* misbehaves. After observations we made the following comparison (*A*, 2627 of

Dent, the standard of all; C, which we take with us in this trip as our standard, while A remains at Tetté):—

	h.	m.	s.		h.	m.	s.
A	5	42	30	A	5	44	30
Hack E	5	33	53.6	C	5	46	5.5
		8	35.4			1	35.5

The occultation was observed in the hope of making Tetté our starting point. We take three chronometers, B, C, and E, and leave A and D at Tetté.

July 31st.—Cannot give you more at present, as H.M.S. *Persian* is off, and ready for mails.

D. LIVINGSTONE.

MY DEAR FRIEND,

Senna, May 12, 1859.

We have just returned from the discovery of a magnificent lake, called Shirwa (Sheer-wah), and, if native report be true, there is only a small partition between it and Lake Nyanja, &c., of the map-makers. We returned to the Shiré after allowing the alarm our first appearance there had excited to subside, and leaving the vessel with a chief called Chibisa, Dr. Kirk and thirteen Makololo proceeded with me on foot to the north, through a high mountainous country. After a fortnight's rather zigzag work, for we had to go from one village to another, we found a high mountain called Zomba or Dzomba, on our east, and crossing the southern talus of that on the 14th April, we got a glimpse of the Shirwa.

On the 18th April we stood on its shores, and a goodly sight it was to see, for it is surrounded by magnificent mountains, and the lake is 2000 feet above the level of the sea. Zomba is 6000 feet, and inhabited on the top. As far as the lake itself, Ngami (which, by the way, I never called "Great"), is a mere pond to it. We could, from an ascent 200 feet high, see 26° of watery horizon, and we could see the tops of two mountains rising like little islands 50 miles away. There is a mountain-island in it which, too, is called Shirwa, and the waves dash on the shore as on the bay of the sea. No outlet is known, and many streams run into it; the water is bitter, but drinkable. When a strong south wind blows, the water retires from the south shore, so as to enable the inhabitants to catch fish in weirs. From what the people tell us, we conjecture it (mind it is only conjecture) to be about 25 or 30 miles where we were, and 50 or 60 long.

It takes the natives four days' paddling, but two if the wind is strongly in their favour. Shirwa being more pronounceable than Ngami, we expect a higher price for it, if wanted as a title to a book by those who come after us. It is of a pear shape. The northern part is said to be only 5 or 6 miles distant from Nyniyesi, which, meaning "stars," is prettier than Nyanja, which means "river," or large water.

On returning to the vessel we came down the Shirwa, instead of the Shiré valley, and saw that the tail—for, after all, it is more like a tadpole than a pear—came down a good way south. We then went down the Shiré to 16° 30' and entered the Buu, a branch of it; ascending 7 or 8 miles, we found that we were not much more than 30 miles from the lake. We could not hear a word of Burton, or of any exploring party. If he has discovered Nyanja, then we have got a lake of our own, and a short cut to his. We cannot find that any white man ever saw this Shirwa. The Shiré does not come out of it; so it is not that spoken of by Mr. Candido.

By the way there is an old lady at Tetté who remembers distinctly the two

"black men" who came from Cassangé to Tetté. They carried the Londa weapon, had woolly hair, plaited Londeze fashion, and never went to Mozambique, or anywhere but Tetté. They did not cross the continent at all. This is confirmed by not crossing either Shirwa or Nynyesi; the former being directly abreast of Mozambique.

The land generally lay high, was cold, very fertile, and well peopled by Manganja. Dr. Kirk and I slept on the ground twenty nights, and got wet by dews every morning from the long grass which overhangs the paths.

The vegetation was very like—often identical with that of Londa. I never saw so much land under cultivation of cotton. Every one spins and weaves it. Even chiefs may be seen sitting and spinning, or picking it. People have no guns, but use bows and poisoned arrows. Almost every village has a smelting-furnace for iron. As far as we went, the Shiré was descending rapidly from higher lands. Some days we ascended 300 feet, and the water ran as in a mill-race; water-power, without dams, sufficient to drive all the mills in Britain. I send a list of observations I have calculated for two places in order to fill up a sketch-map.

Chibea's village, at Island Dakanamolo, lat. $16^{\circ} 2' N.$, long. $35^{\circ} 3' E.$; Lake Shirwa, at Mount Pirimiti (or Mopenopeno—unpronounceable), lat. $15^{\circ} 23' N.$, long. $35^{\circ} 35' E.$ At Dakanamolo Island, where vessel was left, I got but one side of the Δ -clouds, though we slept on the ground for a good look-out. I shall give you better observations when I get my sextant-stand.

Dr. Kirk to Dr. Livingstone.

Sir—

"Tetté," February 14, 1859.

Having had the honour to accompany you on the Expedition up the river Shiré, I beg to hand over the following report according to your request:—

We entered the river on the 29th December, 1858, and came to an anchorage in the afternoon, opposite the north-western extremity of the mountain "Moramballa," lat. $17^{\circ} 24' S.$ So far the river is confined between banks from 4 to 6 feet high, covered with long grass; it has a 2-fathom channel, free of sand-banks, and a current of $2\frac{1}{2}$ knots.

At the junction of the "Shiré" and "Zambesi," a little above "Shamoara" Hill, the contrast between the waters of the two rivers is very marked, that of the "Shiré" being comparatively clear, and bringing down an immense amount of "Pistia" and other aquatic plants, while the Zambesi, now in flood, is muddy, but free of those plants.

The river Shiré flows at first nearly parallel with the Zambesi, until, on passing the southern end of "Moramballa," it takes a course to north by the foot of the western slope.

On the 30th December, 1858, we ascended "Moramballa" by a rocky ravine in the north-west angle. The slope for the first 3000 feet was very steep; from most points the summit is inaccessible. We then reached a plateau covered with hills, the intervening valleys being from 300 to 600 feet in depth. Having crossed several of these, we reached a village (altitude 3594 feet), where we remained until the following morning.

This elevated region is extensively cultivated; the people are hospitable and unsuspicious, alike independent of Portuguese and of the people of Mariano, with whom the latter have been at war.

The vegetation differs from that of the plains; the damp valleys abound in ferns; the orders "Balsaminæ" and "Protocæcæ," neither of which has been observed on the plains, are both represented.

The whole district is well watered by small streams arising in springs often slightly chalybeate.

The highest peak ascended was found by the barometer to be 3814 feet; we could see another not far off, at least 300 feet more; we may thus assume the general summit level of "Moramballa" as nearly 4000 feet above the "Shiré."

Nowhere on the Zambesi have I seen so much cultivation. Maize, yams, sweet potatoes, peas of various sorts, cotton, sugar-cane, tobacco, and ginger, are grown in the gardens; lemons are abundant in the forest.

From different peaks we had a general view of the surrounding country. On the west the river "Shiré" is at the foot, a wide plain extending beyond as far as the hilly district north of "Senna."

To the north a series of jagged peaks seem to continue "Moramballa;" the most remarkable of these is named "Makaranga."

The valley of the Shiré lies between these two ranges of hills; the river crosses it diagonally, taking a very serpentine course.

On our return we passed a sulphurous spring near the foot; found the temperature at the source 174° Fahr.

We started on the 1st January, 1859, and by the 4th had completely crossed the valley and reached the northern angle of the western mountains. The banks are not above 4 feet high, the plain is formed into islands by branches of the river, and here are also lagoons in which the people find the water lily-root, which they roast and eat.

Although this valley be well peopled, the amount under cultivation is small. With any encouragement the whole might yield rice, cotton, or sugar-cane; by the banks we observe tobacco, Indian hemp, ochre, and pumpkins, seemingly uncared for.

The Shiré valley and adjacent country is inhabited by the "Manganja" tribe, governed by local chiefs; they are quite independent, having never been subdued by the Portuguese, and are considered so warlike that no trader ventures among them. The men go armed with poisoned arrows, the women wear an ornament consisting of an ivory ring one inch and a half in diameter, and one in depth, either tubular or cut in the form of a cup; this is inserted in a slit through the upper lip. Their language is a modification of that of "Senna" and "Tetté," but is unintelligible to natives of these towns.

The valley bends to north-west, having to the south-west the northern boundary of the hill district, and an extensive mountain-mass to the north-east in the distance. The ranges composing this mass have a north-west direction; one of the most easterly of these ends to the south in a large lofty mountain, named "Manguru" by the natives. It is the most prominent object in the horizon; some of the other hills are bold and rugged.

The part of the valley here seems marshy and uninhabitable, but the river abounds in hippopotami, and the plains are covered with herds of elephants, with very fine tusks.

While in the midst of this desolate tract, our supply of wood was ended, and we should not have been able to proceed further had the happy idea of burning the bones of elephants not occurred to Dr. Livingstone, by means of which we pushed on to a well-wooded district at the foot of the hills. Both valley and hill-slopes were cultivated; the banks were higher than in the lower parts.

On the 9th January our onward progress was stopped by a cataract, called "Mamvera," having a fall of 12 feet in 150 yards, among large rocks. This is situated where the Shiré comes out from the hills. The natives spoke of the river, while crossing the mountain-ranges, being a series of such cataracts, with one large fall. Beyond the hills it is again free from obstructions, and navigated by Arab traders in canoes, up to the lake "Nyanja." The overland journey was spoken of as five days.

Being the first Europeans in this region, we were looked on with suspicion, and closely watched night and day; yet our wooding-party on shore was never molested.

While this feeling of suspicion continued it would have been imprudent to undertake an overland journey. We remained three days in hopes of a clear sky for observations, which also gave us an opportunity of showing the people that we had no hostile intentions; and we may hope to find the path open to future exploration.

While we remained the people came off in canoes for trade. We purchased abundance of provisions at a cheap rate. They brought cotton of two qualities, both fine; it grows here with little care, and, even when the plant is burned down,

springs up again the year following. Sugar-cane grows well, and probably the natives extract sugar from it as is done by the people to the west.

We started on our return January 12th, entering the Zambesi on the morning of the 14th.

We have thus shown a navigable river to exist upwards of 100 miles in length—a people engaged extensively in agriculture, with a soil capable of growing not only cereals but also cotton and sugar cane of excellent quality, and in almost unlimited quantity.

This rich valley may be divided in three portions: the first, near the Zambesi, about 20 miles in length, cultivable; the second only 15 miles, marshy, but abounding in game; the third 25 miles: this is probably both the richest and healthiest of the three. The general width may be estimated as 20 miles.

The situation of "Moramballa," at the junction with the Zambezi, would be of the greatest importance to Europeans as a healthy station midway between the growing district and the sea.

While in the river none of our party complained of the least sickness, although we were much exposed, and this is the unhealthy season.

I have the honour to be, Sir,

Your most obedient servant,

JOHN KIRK, M.D., Zambesi Expedition.

To Dr. Livingstone, H. B. M.'s Consul, and
Commander of the Expedition.

Mr. Charles Livingstone to Dr. Livingstone.

Tetté, Feb. 16, 1859.

SIR—

The river having risen 134 feet on the 18th January, I took the boat and eight Makololo, and, accompanied by Mr. Baines, started to view Kabwabasa and the cataract Morumbia, when the river was full. By keeping close to the shore the men were able to paddle from 2 to 3 miles an hour. The rains have wonderfully changed the appearance of the country. Now all is fresh and green; the bare fields are covered with crops of native corn and maize. When we came to the entrance of Kabwabasa the river had fallen from 2 to 3 feet. The current being stronger than the men could paddle against, in some parts from 34 to 5 knots, we were obliged to drag the boat up, and did so till we came to the hot spring 3 miles above Sinangive, where the steamer lay. Leaving the boat here with two Makololo we proceeded up the right bank. The first rapid had entirely disappeared; smooth water over it, and also on the west of the rocky island, only about a foot of which was visible. The three-channelled rapid had also vanished.

Not unfrequently we passed deserted hamlets, the Banyai having driven off the inhabitants soon after corn-planting; cotton was growing in the gardens, in some instances in large quantities. About 6 miles below Mount Stephanie the path led through a rich valley, in which was growing abundance of native corn. Here we found some inhabitants. A lad offered to show us a short path to Morumbia for a fathom of cloth. Accepting his guidance, we were led up a steep and lofty hill, the summit of which was inhabited. A heavy shower made us glad to accept an invitation to take refuge in one of the huts. Our host delivered a long oration to our guide, seemingly in blank verse. At the end of every line the lad gave one of the oddest grunts that ever proceeded from human lungs or stomach. After this the guide refused to go any farther. A mile beyond we obtained quarters in a hut belonging to the chief of these poor people. The chief Dasi and two of his men visited us, and sat an hour, but politely withdrew when they saw that our supper was nearly ready. Next morning Dasi gave us a guide, who led us about 2 miles, and then, to the

great indignation of the Makololo, left us, instead of leading us to the cataract of Morumbua. The path he pointed out brought us to the river opposite Mount Stephanie, 6 miles below Morumbua. I suspect that fear of the Banyai prevented them from showing us the short path. An attack of fever prevented me from going on next day. The following day we went forward about 2 miles over the rocks. The river had fallen greatly, so that the appearance of Morumbua could not differ much from what it was when you first saw it. Mr. Baines, with one Makololo, proceeded on and obtained a sketch. While waiting his return, three fishermen, whose friendship was secured by a present of a little food, informed us that the rapid opposite disappeared and all was smooth when the river was full. This was evidently the truth, as we had seen it two days before when the river was 2 or 3 feet higher, and it was then comparatively nothing. They likewise informed us that there was no cataract at Morumbua when the river was full, and the current was not strong. Mr. Baines saw about 2 miles of the river beyond Morumbua, and the channel was much wider. Returning we reached the boat in safety, and arrived at Tetté in the afternoon of the following day, after an absence of sixteen days.

I have the honour to be, yours, &c.,

CHARLES LIVINGSTONE.

To Dr. Livingstone, &c., &c.

Mr. T. Baines to Dr. Livingstone.

SIR—

Tetté, Feb. 20, 1859.

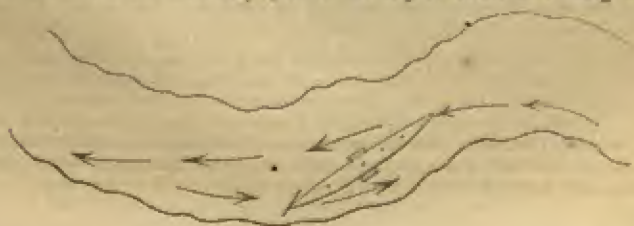
Having had the honour to accompany Mr. C. Livingstone on a trip to Kabrassa, I furnish, according to your desire, a report of the information I have obtained.

The river having risen above 13 feet upon the gauge, we left Tetté on Tuesday, January 18th, about 10 A.M., the current being 3 knots; but in the hollows along shore we found often an eddy of more than a mile per hour running up. We had to cross occasionally for the benefit of this, and were generally from five to seven minutes in doing so. A rifle ball, fired at 300 yards' elevation, fell considerably short, so that I suppose the river to be between a quarter and half a mile wide.

Friday, 21st.—At 4 P.M. we passed the Copper Mountain, or "Pandamakaa," and entered the Narrows of Kabrassa on the eastern side, which seems to be the best for small boats; the eddies helped us on nearly half a mile, when we were stopped by a projecting rock, and had to pass a line to haul the boat round it; this we repeated as often as necessary, and stopped at night on a sandbank, under the lee of some rocks, past which the current was running violently. I could not ascertain its rate, as the log was whirled into the eddies, but should think it nearer 6 than 5 knots.

The south-western side, for the first mile, is formed by a mountain steep down, on the solid rocks of which the water can make no impression, and the current, being forced by the bend above to the eastern side, overflows the edge of the deep ravine forming the low-water channel, and makes all sorts of bays and eddies on the low land at the foot of the hills beyond it.

Into these eddies, however, I should think it unsafe for any vessel larger than a boat to enter, as she must keep speed on her to prevent her head being whirled



down the stream, while her stern is still held by the up-current; and it is in the small space of still water between these two that she would be in danger of running on concealed rocks, which, in the stronger current, would cause a ripple, and warn the navigator of his danger.

The rocks that had towered above our steamer on her last trip were now covered, but their place was marked by the current rushing over them into the vacuum its rapidity had caused under their lee, and in some cases by a return breaker 3 or 4 feet high, surging into the hollow; and this, I think, would indicate any rock not more than that depth below the surface. I noted about four of these dangers in the first mile.

Saturday.—Proceeded as before, paddling up in the eddies and hauling through the rapids; they do not extend far from the shore, but are caused by projecting rocks over which the water falls at different angles and with various force, and are extensive enough to force a boat into the current, which she could not stem.

We passed within the rock, near which the steamer lay, to buy provisions, and entered the little river "Lexinga" for the same purpose; we had two accidents with the rudder, but I managed to put it into working order again. In the afternoon passed an immense boulder 25 feet high. I of course could see nothing till the word was given to haul round, when I saw "Charumba" on the top passing the line over, and Mr. Livingstone and a Makololo in an isolated position, that made me at first wonder how they had got there.

Sunday, 23rd.—Passed several rapids as before, and came to one worse than we had yet encountered. I suppose the fall to have been about 3 feet, or 9 inches higher than the boat's bow; the men could not haul her up, nor at one time keep her from going on the rocks over which the stream was pouring. "Cavare" stood in the bows, straining himself to pole her off, and "Mantanyana" did the same in the stern, but it was not till the third attempt that I could succeed in entering the boat fairly into the rapid.

Between 9 and 10 we came to the bend, where the river, coming more from the west, overflows its barriers, and forces a considerable body of water to the foot of the eastern hills. The rocks to which Walker brought up the whale-boat for the party on our last trip now formed the western face of a large island in the angle, and between them and the eastern shore was another large insulated block dividing the channel into two. We walked round the island, and found that the water forced against its western side was turned abruptly to the south, and rushed downward in a line of dancing sharp-edged waves, or rather up-heavings of the water, 4 feet or more in height, rising and falling in most indescribable confusion; round the edges of these were large whirls, in one of which a tree seemed to be carried backward about 15 yards, and between it and the tail of the island was a return eddy that would most probably have carried the boat into the whirl, where no one could have retained command of her. We then took the boat to the eastern channel, which we found running over a flat of large stones, between which a man sank thigh-deep, but their points would very likely have stove the boat, though with great care she might possibly have been taken through.

We then crossed the river below the island, where we found the eddy so strong that I was forced to steer back to the shore. While the Makololo paddled with their full power the water appeared sometimes to be calm, and at others to rush up from the bottom, overspreading a considerable extent. We had to pass below one large rock, and above a ripple caused by a submerged one; toward this the current drifted us rapidly, and, knowing the uselessness of fighting such a current, I wasted no time in keeping the boat's head up the stream, but put her straight across; the men also, seeing the necessity for exertion, did their best, and said afterwards that no canoe could have passed such a place. We landed on an island of rock and sand, and Mr. Livingstone decided to haul the boat into a creek and prosecute the rest of the journey by land. I went forward to the hot spring where I had taken the boat on the previous journey, but found it covered by the river-water.

Monday.—The rising of the water into creeks forced us to travel inland. We saw two zebras, and soon after a hippopotamus, feeding on an island about 300 yards distant, and halted at night half a mile below the Shibadda, or Two-Channel Fall. I made a sketch, but the want of light rendered it not very perfect.

Tuesday, 25th.—I went to the bank overlooking Shibadda, and found that the

rise of the water had smoothed over every obstacle. The top of the island looked only like a small rock not more than 8 feet high, and there seemed no impediment to a steamer of sufficient power; for further testimony I called "Mantanyana," and made him point out every spot he remembered in connection with our camping near it. We passed the next, or three-channel rapid, which seemed to be also smoothed over, but, as we travelled farther from the shore, I could not identify the island; the rocks on each side forming so many new ones. I called "Mantanyana" as before, and perfectly satisfied myself as to the locality.

A very good path led us past the mouth of the "Luia," which was proportionately swelled. I had hitherto been foiled by eddies in attempting to take the rate of the current, but here I found it $3\frac{1}{2}$ knots, very nearly. We camped at night near a small stream, and towards morning were visited by a drenching shower.

Wednesday 26th.—Passed many fine baobabs, not disfigured by being barked for corfage, and several young ones, the absence of which I had hitherto thought remarkable. We were guided by a native up the hills some distance from the river, and slept in a hut at night.

Thursday.—A native showed us a path which came out opposite Mount Stephanie. Mr. Livingstone had gone ahead of the party, and, the ground being nearly all rock and bush, it was next to impossible to track footsteps. I went on to some native huts, and one of the men went with Mantanyana, in various directions, without success. I then thought that the best course would be to go onward to the waterfall, whither we were bound, but in a short time I was called back, and told that our companion was at the village we had just left; two men went up and returned with Mr. Livingstone, and, as he was too ill to travel farther, I immediately sent a man after "Mantanyana" and "Mbea," who were searching the lower road, but he returned without finding them. I fired guns, and sent another next morning, who returned with them about 10 o'clock.

I made a sketch of the south face of Mount Stephanie, and though part of it may very likely be of the beautifully coloured red and yellow rock (of which I saw a block lower down), I think a great deal of the colour is caused by lichen, especially as on the south side it seems to run down in streaks, following the most probable course of water. I would, however, offer my opinion with great diffidence on this point, and leave it to be decided by future observation.

Saturday, 29th.—We passed the north-west end of Mount Stephanie, where we saw a rapid quite impassable at that time, but it appeared as if the water had fallen 10 or 15 feet, so that it might have been smoothed like the others. Mr. Livingstone turned back with the party, but I obtained leave to go on to "Morumba" Falls, which had been seen previously by Dr. D. Livingstone and Dr. Kirk, on condition of being at the camping-place on the evening of the next day, or at the boat within six days from the time of our separation.

Finding that the man who carried my bedding was not able to keep up with me, I left him under a rock, giving him free rations and a blanket, and a strict charge not to stir till I came back to him. I travelled about 3 miles more over the loose boulders when I was stopped by cliffs sloping at an angle of 45° or more down to the water. I had to climb to a considerable height before I could pass these, but at length was rewarded by a sight of the place in which the great fall was (and which I recognised from Dr. Kirk's outline-sketch), and of a beautiful reach of quiet river stretching a couple of miles farther to the westward, between hills, with rocks coloured like Mount Stephanie. The fall was hidden by a rock, but I shifted my position till I was enabled to see it. It did not look so formidable as in Dr. Kirk's sketch, but this might be owing to the height from which I viewed. I would have tried to get nearer but for the limited time allowed me. I sketched it and began to return, but, finding myself in difficulty in the dark, picked out the best place I could to sleep on.

Sunday, 30th.—After a hard climb I made my way over the side of the hill and down to the river. I found by footsteps that "Macomecemo" had followed me some distance and returned, but I found him all right at the rock, and, after eating some cakes, we returned to the camping-place after sunset, where we found a note stating that the party had left after 7 A.M., and were to be guided along the river by a native.

Monday, Jan. 31st.—We found the path by the river-side, and reached the hut

we had built by the rivulet where the rain caught us. We ate our last cake and a piece of elephant's hide a native had given us, and found by a note that the party had slept there the night before. I reached the boat, in the afternoon of Wednesday, February 2nd, about five hours after the party, but could not eat the refreshment that was provided for me; and, after a rainy night, we embarked and found the *Ma Robert* lying off Tette, about 1 or 2 P.M.

I am, Sir, your most obedient servant,

T. BATES, Artist to the Zambesi Expedition.*

*Dr. D. Livingstone, H. B. M.'s Consul, Commanding
Zambesi Expedition.*

Extracts from DR. LIVINGSTONE'S Despatch, dated Sept. 6, 1860.

THE return of the Makololo from Tette to their own country by a march on foot of more than 600 miles was accomplished during the three months between May 16 and August 16 last. We have thereby kept faith with that people and their chief, Sekeletu, and in addition have examined most of the river above the rapids of Kabraba at low water—entered into amicable relations with the people on its banks, without submitting to the exorbitant and degrading payments for leave to pass to which the Portuguese are subjected at every village—ascertained that the coal-field extends not only to Zumbo, as I formerly pointed out, but nearly to the Victoria Falls—found cotton cultivated largely, which, according to Mr. C. Livingstone, resembles closely a superior South American species, and decidedly of a better kind than that of the foreign seed which we had for distribution, and after breathing for a short time the clear cold air of the highlands, where we actually saw the hoar-frost and a little ice, descended into the great central valley and delivered the letter of Her Majesty's Government to Sekeletu, the chief of this country. . . . In noticing the points of most interest in this land journey, the very deteriorious effects of contact with slavery must not be omitted. The Makololo had lived for years among slaves, and many had formed connections with slave-women, and had children by them. As the party consisted almost entirely of people conquered by the Makololo, it was to be expected that some would prefer remaining at Tette to returning to their own country, where, though not slaves, they are looked upon as an inferior class. In their mode of separating from us it was evident they had imbibed largely of the slave spirit. In the interior I have rarely had to regret having trusted to the honour of the natives; but here, though it was publicly proclaimed three times that any one wishing to remain was at perfect liberty to do so, and it was hoped that no one would carry our goods a few days' distance, and by returning entail

* For later information respecting Dr. Livingstone's Expedition, see 'Proceedings' N.O.S., Vol. V., No. IV., p. 203, &c.—Ed.

upon us loss and difficulty, all professed the greatest readiness to return to Sकेलेतु; but every night one or two ran away as if they had been slaves. They would not make their intentions known, and it was very annoying to have to appear as if using compulsion, when perfectly willing that each should follow his own choice. About twenty, or one fourth of the party, left us either by running away or shamming sickness. This is nearly the same proportion as occurs in the experience of Portuguese traders and their slaves.

We travelled along the north bank of the Zambesi, crossing in our course the mountain-mass in which Kabra-basa rapids are situated. The cataract of Morumbua therein is the only serious difficulty in the navigation, and it could be passed by a powerful steamer in the period of full flood. At Chicova a dyke of basalt stretches at an acute angle, exactly like an artificial dam; but there are two openings in it of from 25 to 30 yards wide, and deep enough to allow the whole body of water to pass in the dry season. The rapids of Kausalo and Kariba, about 30 miles above the confluence of the Kafue, are of the same nature as that of Chicova, and canoes are said to pass with ease; but we mean to purchase canoes at Sinamanes, and return by dropping down the stream, so that nothing escape our notice. The part of the Zambesi which in 1855 I did not see except in the distance, and extending from the confluence of the Kafue to the Victoria Falls, flows gently in a well-cultivated and densely-peopled plain. The ranges of mountains are not so near the river as they seemed from the highlands on the west. It is much narrower than below the Kafue—300 or 400 yards only—but deep enough even at low water for a small steamer to ply constantly.

If we divide the Zambesi into three reaches, namely, from the sea to Kabra-basa—from Kabra-basa to Kausalo—and thence to Victoria Falls—we find that each reach is abundantly supplied with coal. Your Lordship's attention has already been directed to the coal-field at Tette. In addition to a former discovery of coal on the south bank above Chicova, we now discovered the mineral in two rivulets on the north bank. Blocks of it, a foot or more square, lay in a stream, called Sinjere, and, curiously enough, the natives did not know that it would burn. The same coal-field extends, with occasional faults from the bursting through of igneous rocks, nearly to the Victoria Falls, and the quality is better even than that of Tette. It resembles closely English domestic coal, for it froths like toasting-cheese in an open fire. This vast coal-field will possibly modify the calculations of philosophers as to the amount of mineral in the world, and it may constitute an important element in the future greatness of the Cape colony.

The people inhabiting the valley of the Zambesi above the con-

fluence of the Kafue are chiefly Balenje and Bawe; but they are much mixed with other tribes. They all cultivate the soil and raise large quantities of grain. A considerable amount of remarkably fine cotton is also planted, yet a large number of the men go stark naked. They are not inferior in any respect to the natives who clothe themselves—the women are all decently covered; but these Baenda-pezi, or go-nakeds as they are called, are absolutely devoid of shame. Their tobacco-pipes are elaborately ornamented with iron and copper, and they are sufficiently conceited in the fashion of their hair and the colour of the beads around their necks; but though they deny the existence of any law on the subject except custom, neither laughing nor joking could arouse the sense of decency. What was of more importance, they were very hospitable, and accompanied us for days together, carrying the burdens of our men for very small payments.

On reaching lat. $17^{\circ} 18'$ s., we turned westward towards a mountain, called Qa-ba-chen; ascended about 2000 feet above the valley of the Zambesi, or 3300 feet above the level of the sea, with the intention of crossing the highlands of the Batoka country there, and shaping a pretty straight course to Lesheke. The clear cold air revived our spirits, and though we had hoar-frost in the valleys and a little ice in shallow water, it is probable the ground never freezes so as to destroy the roots of tropical plants. It is to a part of this elevated region that the Makololo wish to remove, and here Europeans would probably enjoy immunity from the fever. When we came to a point about 20 miles north of the Victoria Falls, we could see the columns of "smoke" distinctly with the naked eye, and I could not resist the pleasure of showing the wonderful scene to my companions, though by going down to it we added some 40 miles to our tramp. The river was now very low, and there was no danger in passing down to the island in the middle of the river and on the lip of the fissure in which it falls. After a second visit, I think the scene the most remarkable in the world, and none but an artist in oil-colours could convey a true idea of it. The water being very low, we could see that this part of the crack into which the Zambesi rolls is of the shape of the letter L. There is another fall below this, called Moamba, which we hope to examine as we return.

We found Sekeletu labouring under a skin-disease, which was believed by his people to be leprosy—the effect of witchcraft, and several of his principal men had suffered death for the crime. Dr. Kirk and I undertook the cure, and he is now nearly well. Compelled to live among the swamps of Linyanti from fear of their great enemy Mosilikatse, the true Makololo are perishing. The black tribes whom they have subjected to their rule preponderate greatly, and unless they can remove soon to the healthy highlands

in the north-east, the nation will break up. The Rev. R. Moffat having long been a friend to Mosilikatze, it is universally believed that the presence of any member of his family would secure the Makololo from war. Had his daughter, Mrs. Livingstone, come, they would at once have removed to a country where cotton and sugar grow luxuriantly. She travelled overland 1000 miles from the Cape in order to join me here; but hearing that it was impossible for us to ascend in the small and weak vessel at our command, she returned at great expense to Cape Town. It is this failure that induces Sekeletu in his letter to ask the Chief of the English to send some of her people to live with him. On hinting that feud might arise between his people and English settlers, he replied, "these would be domestic matters only." The country referred to is the most healthy and finest in this region, but nearly uninhabited on account of being open and defenceless. In taking down Sekeletu's answer to the letter of Her Majesty's Government, I carefully abstained from making any suggestion, and allowed him just to say what was uppermost in his mind at the time. The letter was read at a public meeting of the people, and the answer may be considered as an expression of the wishes of all the intelligent men of the tribe. The translation is as literal as the idiom will allow.

The Makololo eagerly availed themselves of the opening for commerce made to the West Coast in 1855; but an Arab from Zanzibar, to whose guidance the first trading-party was entrusted, has probably played false, for not one of ninety-five persons composing it has ever returned. Notwithstanding this, other trading-parties have been sent since, and we found one detachment of Makololo just returned from Benquella with goods bought with ivory. I have not discovered that the law promulgated by Sekeletu against selling children and others to half-caste slave-traders, has ever been publicly broken; but among such a mixed population as the Makololo subject-tribes, some of whom live between 200 and 300 miles from the capital, I suspect that secret transactions may have taken place in violation thereof. The real Makololo are intelligent and enterprising: they would soon learn to cultivate and collect the raw materials of commerce, were we once able to set them an example. The party which now returns with us to Tette, consisting of sixteen persons, are instructed by their chief to lead us, in the event of our being able to bring up our luggage, at once to the healthy highlands. Sickness alone prevented Sekeletu from accompanying us part of the way to select a healthy locality for the whole tribe. He is afraid that, should he venture abroad before his complete cure is effected, the wizards who inflicted the disease might destroy the good effects of our remedies.

*Extract from DR. LIVINGSTONE'S Despatch, No. 10, dated Tette,
Nov. 24, 1860.*

THE elephant-hunters, whom we expected should take Despatch No. 9 overland to the Cape, had left Victoria Falls before our return from Seskeke. It will, therefore, accompany this down the Zambesi.

The river having been about two feet lower than we ever saw it, we were able to see one-half of the crack which forms the falls of Victoria distinctly to the bottom. The depth down which the river leaps without a break is not 100 feet, as was formerly conjectured, but 310 feet, or, if I remember rightly, about double the depth of Niagara; and the breadth, instead of 1000 yards, as was formerly stated, is between one statute and one geographical mile. We say 1860 yards by way of assisting the memory, though it is a little more. The lips of the crack at Garden Island, in the middle of the falls, are probably more than 80 feet apart, though the sextant gave that result, for no one could throw a stone across.

The existence of the most remarkable waterfall in the world, in a country which was conjectured by the speculative geographers to be interminable sandy plains, into which rivers ran and were lost, induces me to ask your Lordship to glance at the sketch given in my book. This gives a pretty fair idea of the scene in flood-time, as seen from a point above the falls north-westward; but when we come to the other, or south-eastern, side of the columns of vapour, from which the native name, "smoke-sounding," is derived, we find the sight still more strange. The crack is prolonged in a wonderful zigzag manner. The promontories formed by the zigzag fissure are of the same level as the bed of the river above the falls. Their tops are flat, and so narrow that a few paces enables one to see the whole river on each side of him, 300 or 400 feet below, jammed in a space of 20 or 30 yards. Like the ledge over which the river rolls at the falls, the sides of the promontories are nearly quite perpendicular, showing that the formation of the crack is of a comparatively modern geological date. The river runs in the crack some 30 or 40 miles. On our way down we visited it twice in this space, and saw the Fall Momba, or Mounba: but it is nothing after those of Victoria. The total descent made by the Zambesi between the Great Falls and Sinamane's, where it is smooth again, as found by the boiling-point of water, is (1600) 1600 feet.

Sekeletu sent a party of his people to build a stockade on an island on the lip of the falls, where the fruit-trees planted in 1855 had all been devoured by Hippopotami. It is hoped that this will protect those planted now, while the condensed vapour from the

columns wafted over the island will save them from perishing by drought. Another party conveyed us down to Sinamane's, and had it not been for the honour intended to be done to us by the chief, we should have been better without them. The subject-tribes of the Makololo are so accustomed to plundering in their expeditions, that we had to keep a sharp look-out to prevent them stealing while in our company, and we had to warn the people of every village that we had a lot of thieves with us.

Had we not resolved to endeavour to be at the sea-coast by the end of November, we might have visited Mosilikatze, and made further arrangements about our overland post. The hot season had set in besides, and our sensations had made it questionable if Europeans could do much more than we had done. The temperature of the soil in the sun rose to 137° Fah., and a thermometer held in the shade of the body in marching showed 102° — 104° . The blood even became a degree and a half hotter than that of the natives, or $99^{\circ} 5'$. We were, therefore, very glad to get into the canoes which we purchased from various headmen on the river. These vessels are so small that a little wind is dangerous, and so is the ripple of a rapid. On one occasion they were suddenly filled, but the men behaved admirably, by leaping out and swimming alongside till we came into smooth water. At another part the men of the first canoe, having passed a dangerous eddy safely, looked back to the second and third drifting into it, exclaiming, "Look where those people are going," and were themselves swept against a rock and upset. By this accident we unfortunately lost the chronometer 1960, an aneroid barometer, a rifle and revolver, and some private property: the water some fifteen fathoms deep, and a rapid current, rendered it quite impossible to recover anything.

In our voyage down we gleaned the following points respecting the river itself. From the point where we embarked (Sinamane's) to Kansulo, the river is more navigable than between Tette and Senna, though it is only 300 or 400 yards broad, or like the Thames at London Bridge. It is deep, and flows gently. A little below Kansulo, at Karibu, there is a basaltic dyke stretched across the stream like an artificial dam; but it has a wide opening in it, dangerous only for canoes. The river is then narrow and deep, and flowing for several miles through a range of mountains. Still further down, at Mburuma's, there is a rapid of about 100 yards in length, where the current is nearly six knots an hour. This is the most rapid part of the Zambesi, except in actual cataracts.

Chicova, of which geographers have sometimes spoken as a kingdom and sometimes as a cataract, has no population on land, and a basaltic dyke we noticed on our way up was passed through

during our descent without being observed, but we marked a fine seam of coal in the bank instead. Below this several rapids had been developed by a fall in the water of 15 feet. They were quite smooth when we were marching upwards. The only great difficulty is Morumbria in Kabra-basa, and it is all but certain that, at full flood, when the river in that part rises 80 feet, the cataract will be smoothed over.

The numbers of animals that come to drink at the river during the dry season are prodigious. Nowhere else are such vast herds of elephants, buffaloes, and hippopotami, to be seen as in the parts between Victoria Falls and the Kafue. It was sometimes necessary to fire at hippopotami to get a passage for the canoes. We observed one pure white, as if an Albino, and several piebald ones. The people were all friendly, and were anxious to know if we had persuaded Sekeletu to restrain his people from making forays in their direction. As we pointed out to him the good policy of employing the inhabitants of the left bank to watch any movement of his enemy Mosilikatze across the river, and he was quite alive to the importance of doing so, it is probable that marauding in this quarter will not be allowed.

Extract of a Despatch from DR. LIVINGSTONE,
No. 1, Feb. 9, 1861.

IN order that your Lordship may see that there are solid grounds for confidence, Dr. Kirk's general Report on all the useful botanical productions of all the parts visited by the Expedition is now laid before you, and I crave particular attention to the decided superiority of the *uncultivated* African to the common cultivated varieties of American cotton. The very best American known as "sea-plant" cotton, grew at Tette, under very unfavourable circumstances, and yielded wool $1\frac{1}{2}$ inches in the staple. It continues to flourish, though uncared for, as if no time were required to acclimatize it. This is the only kind that might be introduced as an improvement. Most of the others are inferior to those growing already in the country. One variety, referred to as found at Sesheke in the middle of the country, showed a woody stem of 8 inches diameter, and the branches covered a space of 12 feet square. It was, in fact, like one of our common-sized apple-trees, and had yielded a crop of excellent cotton, though the crop of native corn had entirely failed by a drought. It is to be remembered also that the vast region to which your Lordship has been pleased to direct our attention is even better adapted for cotton than the lands on the Zambesi claimed by the Portuguese.

XXI.—Sketch of the Country between Jervis Inlet and Port Pemberton, on the Lilloet River, a Branch of the Fraser River, British Columbia; with a Map. By Lieut. RICHARD C. MAYNE, R.N., of H.M.S. *Plumper*.

Communicated by the LORDS COMMISSIONERS OF THE ADMIRALTY.

Read, June 10, 1861.

TO CAPTAIN GEORGE H. RICHARDS, R.N., H.M.S. *Plumper*.

H.M.S. *Plumper*, Esquimalt, Vancouver Island,
July 23rd, 1860.

SIR,

I have the honour to report, that, in compliance with your orders, I left the ship on the 3rd instant with a party of five Indians, and accompanied by Dr. Wood, M.D., to endeavour to penetrate the valley running northward from the head of Jervis Inlet, or at least to ascertain if that valley could be used as a road to the gold-fields of British Columbia. Only landing in the afternoon, we got but a few miles that night, and camped about 5 miles from the beach, the way so far having been through dense woods, with thick undergrowth of raspberry, &c. Next morning, after proceeding about a mile, we came to the La-ä-kine River. Immediately we reached this stream the Indians said we should not be able to get on, as from the depth of the water in it there they knew we could not cross it higher up; and even if we succeeded in crossing this stream, the Squāwmiht and Lilloet rivers would be over our heads, as when there is little or no water in the La-ä-kine these and three other rivers which we should have to cross are waist-deep at the fords. We thought, however, that they might be exaggerating, and pushed on. We crossed the stream with great difficulty, owing to its depth and velocity, three times, and struggled on till four o'clock, when we came to a place where the Indians said we must again cross if we wished to go on. The only means of crossing here was by a single log, 2 feet under water, over which the stream, about 400 yards wide, was rushing in a torrent; and after an effort I gave up the idea of getting along it. We then felled the only tree near which could at all answer our purpose, but with no success; and I decided on relinquishing the attempt to get further, and camping here for the night to retrace our steps in the morning. There is no doubt that had we remained there we should ultimately have been able to cross, though it might not have been for weeks; or by forcing our way higher up, and felling a number of trees, we might have bridged the stream; but this did not appear to me to be your wish or the object of the expedition. You particularly pointed out in my written instructions the futility of proceeding unless the route was such as to be available as a way to the interior, and I was quite convinced that this valley could never be turned to account as such. The Indians never, I find, go this way in summer, but only in winter, when the snow is on the ground, and the bed of the La-ä-kine is dry or nearly so, and the Squāwmiht and Lilloet are much lower. They were very urgent from our first coming on the stream that we should not proceed, and, though not sulky or refusing to go, every time we stopped they endeavoured to impress on me the impossibility of reaching the Fraser.

In making a road the difficulty of crossing the rivers would of course be overcome by bridging, but there is really no ground on which to lay a road, unless by blasting it out of the perpendicular mountain-side, for the valley is completely covered by the water when the river is at its highest. The bed is of sand and shingle, and the semblance of a bank which now exists is a swamp in which a mule would sink to his girths. From our coming on the

river in the morning till we camped, eight hours, we were either wading in the water up to our hips, or struggling through the willow, alder, and raspberry bushes on the swampy bank. I therefore most reluctantly determined to return to Jervis Inlet without further waste of time or provisions, and endeavour to penetrate from it to Howe Sound, and from that to Lillooet, and ascertain the feasibility or otherwise of these routes. Accordingly we left in the morning (5th), and reaching our first camping-place that night, arrived at the inlet at nine on the following day.

Having got to the inlet the Indians were very reluctant to start again, but at length did so; and, stopping at their village in the eastern arm that night, proceeded next morning to Deseriet Bay, and started from thence for Howe Sound at two on the same afternoon (7th). We went only 5 or 6 miles that day, and camped on the east bank of the Tzōōnye, a small river which rises, the Indians say, in a lake not far north of this, and runs southerly into Jervis Inlet, near where we started. Directly facing us was the ridge we had to cross next day, and which, had we then known its elevation and difficulty of ascent, would probably have turned us back at once, as alone rendering this pass unavailable.

The next morning (8th) we started up this ascent, and after 12 hours' laborious climbing, we camped on the only spot we could find clear of the snow, more than 4000 feet above our last night's camp. As I said above, this barrier would effectually stop the transmission of baggage this way were all the rest clear; for not only is the elevation so great that at this season we passed over several miles of snow, but the ascent is very steep (about 36°), and we found that, though more gradual, the descent on the other side was infinitely worse travelling than the ascent, and that each day it became worse.

It is useless to detail each day's journey; it is enough to say that we descended by a valley through which runs a river which is nameless, on the east side of the watershed, though called the Quālwāhām on the west side. This river takes its rise under the snow, near the spot where we made our camp, and runs westward into the Trōōnye, at the foot of the mountain, and eastward to the Squāwmisht, which it joins about 20 miles above Howe Sound. Our path, if such it may be called, lay either up very steep ascents or down equally steep descents, through thick jungle similar to that on the Lā-k-kine, and over large irregular boulders of granite and trap, with occasionally, though very seldom, a piece of pretty level copse, there being sufficient rain, swamp, and fording of streams, to keep us wet through all the time.

We reached the village, where we were to get canoes to cross the Squāwmisht River, on the morning of the 12th; and here Dr. Wood determined to leave, he being so much fatigued with the exertions of the last week as to be unable to proceed; and having procured a canoe, he started for New Westminster that afternoon. The village mentioned is a very small one, containing about fifty people. It is situated on the west side of a valley which extends to the head of Howe Sound, down the east side of which valley flows the Tsō-ār-k-ānshīt River, joining the Squāwmisht lower down. This valley does not contain any great extent of clear land.

I here append the remarks given me by Dr. Wood, made on his way down the valley. "Leaving the Indian village where we struck the Squāwmisht, about 2 p.m., we descended the river at a rapid rate, the current running from 6 to 7 knots an hour, according to the width of the channel. It rained incessantly, and, without compass, I could not observe the direction of the channel generally, which is southerly, without any great bend. Some 12 or 15 miles from the spot whence we started the Tsō-ār-k-ānshīt River joins the Squāwmisht on the port-hand (descending), and here the Indians told me Mr. McKay came out. A further distance of 8 or 10 miles brought us to the

head of Howe Sound. I suppose the distance from the Indian village to the head of Howe Sound to be 25 or 30 miles, it occupied us about two hours and a half. The Squāwmišt River averages a width of 50 yards in its course downwards; delta are frequent; and numerous streams are seen diverging by islets formed by river-deposits and consequent settlement by vegetation; sand-bars are frequently passed, tenanted by Indians engaged in fishing; and, as the river widens, rich plateaus of land are seen on either side occupied by Indian villages and potato-fields. The river has apparently some depth, the chief assuring me that steamers could ascend to the village we left, much better than to Port Douglas. The water is derived from the snow; and I should consequently suppose decreasing during the summer, and towards autumn leaving an almost dry river-bed. I slept one night on the port-hand of Howe Sound (descending), and reached Port Woody, at the head of Burrard Inlet, next day about half-past 6. Hauling the canoe up, I started by trail for New Westminster, reaching Esquimalt next day by steamer" (14th July).

I left the village at the same time as Dr. Wood, and with my party in two canoes proceeded up the Squāwmišt River. It took us nearly two hours to get about 4 miles, the river being full of rapids, eddies, and sandbanks; so that we had to cross and recross several times. Its average width was 100 yards, and direction north-east. We landed on the left bank at half-past 3, having gone about 4 miles by water, and shortly afterwards camped.

On the following morning I commenced the ascent, which would form the principal difficulty to making a road by this route, and reached the summit shortly after noon, the aneroid giving an elevation of 2000 feet above our starting-place. By the way we went, about 400 feet of this ascent would be rather steep for a road; but I feel confident, from the general appearance, a more easy grade could be found without difficulty. From this to Port Pemberton was a gradual descent, and though there were some hills to cross, and a great deal of thick bush and rough walking, we met nothing that would form a serious impediment to an engineer.

After passing the summit, our way lay along a gorge by the side of a stream till we came to an abrupt hill, crossing which brought us to a small lake, called, I believe, Daisy Lake, and here we halted for the night. Starting next morning we crossed another hill and immediately came upon the Tsē-ārk-āmišt River, which is here 40 or 50 yards wide, running through a large basin, which appears as if it had been lately inundated; indeed, had it not been for the dead trees still standing, I should have taken it for the bed of a lake from which the water had recently receded. We had no difficulty in crossing the river on the dead wood which completely blocks it up at this point, and we then continued along the basin over sand and boulders of granite and trap, about 2 miles, when we came to that part where the river is still over its banks, as described by Mr. McKay in his published letter. From this point we followed up the route by which he came down, but from this to Howe Sound he went down the valley of the Tsē-ārk-āmišt, and consequently down the east side of the valley at the head of the Sound, while I had come up partly by Squāwmišt valley, and partly by a lateral valley between the two rivers. Judging from his information, his way was quite as good, if not better, than mine. He describes the whole ascent as gradual, with the exception of 300 or 400 feet at the commencement; and even this, he says, is not very steep. I kept along the left bank of this river about 6 miles, when we came to a small cañon; and about 2 miles beyond this we again crossed the river on the dead wood, and camped. This cañon could easily be avoided by bridging the river a short distance below it—an operation by no means difficult, as the bank on the right side is low and level.

A 5-mile walk next day brought us to a lake which extends about 10 miles in a north-easterly direction, averaging 1 mile in width. I have called it

Green Lake, the Indians having no name for it, from the colour of its water. We kept the west bank of this lake to its head, which we reached shortly after noon, and then crossing a small swamp came to a level trail through a wood, and continued in it till night. During the night there was a heavy thunder-storm, which appeared to travel from north-east to south-west, but it did not perceptibly affect my barometer.

Our course the whole of the next day lay nearly due north (magnetic) up the centre of a thickly-timbered valley. At 9, on ascending a small hill, we saw the Lilloet River coming in from the westward between very high precipitous mountains, and beyond these appeared the snow-capped peaks which, the Indians say, surround the lakes from which run the Lilloet, Squāwmtaht, Clāhōose, Bridge,* and several other rivers. They describe it as a basin, very high up, containing 4 or 5 small lakes, in which rise all the larger rivers watering this part of the country. Descending the hill above mentioned we came upon the Lilloet River, and followed its left bank till night, when we crossed one arm of it, over a fall of 200 or 300 feet, and camped. We passed over one or two high steep shoulders, towards the end of the day, by which no animal could go; but this was only from the height of the river and the density of the wood on its bank, making us of two evils choose the least. Indians almost always prefer keeping half-way up a mountain to going along the centre of a valley, so that travelling with them you seldom pass over the exact ground that a road would be made on; and, except as to crossing high mountains or rivers, their description of a route would not convey to a road-cutter a very good idea of the work before him.

An hour's walking next day brought us to a hill-top from which we looked down on the Lilloet meadows; a small lake, dry I suppose in winter, lay at our feet, and stretching miles east and west, dotted with several log-huts and covered with long grass, were the meadows. We got a canoe on the small lake or pond mentioned above, and, crossing it, paddled down a stream running from it and joining the main stream of the Lilloet about 2 miles below, on the left bank of which latter we disembarked. From this we walked 4 or 5 miles across the meadows, till we came to the river again and got a canoe, in which we reached Port Pemberton at noon, having been exactly 5 days from the Squāwmtaht village. In crossing the Lilloet meadows I met several men at work building huts, sawing, turning hay, &c., &c.; they all spoke well of the soil, and the crops of different kinds that I saw appeared fine.

On the whole the country from the Squāwmtaht to Port Pemberton would not be a very difficult one through which to make a road, and if it led to the Fraser above Kayoush instead of at Pemberton, or if so much of the first portage of the Harrison Lilloet route were not already finished, I should most strongly recommend this way being made available. As it is, however, it becomes a question for the Colonial Government whether the distance saved and the difficulties obviated would compensate for the outlay required. The lower portage on the Harrison Lilloet is already two-thirds done, and that is the only portage which would be saved by coming from Howe Sound. All those above Port Pemberton would still be required, unless there is some shorter route from Port Pemberton to the Fraser as yet unexplored; but the roads above Port Pemberton are required equally, whether the lower part comes from Port Douglas or Howe Sound.

About 10,000*l.* has already been expended on the Harrison Lilloet. To open a mule-trail by Howe Sound would cost about 15,000*l.*, a waggon-road 25,000*l.* With the present amount of traffic the two roads are hardly, I should think, required; and it is hardly problematical if, in the present

* The Indian name for the Bridge River is Hojstēn.

financial state of the colony, it would be advisable entirely to throw away the sum expended on the Harrison Lilloet route for the probable advantages of any road which does not lead higher than Pemberton.

I may here speak of another route to the Upper Fraser, about which my present guides have given me some information, and which I believe his Excellency the Governor has long considered as likely to answer the requirements of the colony in this respect, I mean from Clahoose, Desolation Sound. The Indians tell me they know the way, and that it is very good, and may be travelled at any season, as the Squawmish, Lilloet, &c., &c., are so small where this route crosses them that they are easily forded at all times. They say the country there is clear, but this I do not believe, as at the same time they say it would take two months to go from the inlet to the Fraser. Of course one cannot tell where they would meet the Fraser; but supposing it to be south of Chilcoaten, as I think it must be, the distance in a straight line is only 120 miles, and if they doubled this distance by winding about they would only go 4 miles a day; if this be the case the country cannot be very clear. The time taken, however, to get through the bush, before it is cut, affords no criterion of the value of a route. The most difficult bush in this country to penetrate is a mixture of willow, alder, maple, and raspberry, which is very common; but this is the easiest to clear, as there are no large trees to cut down or stumps to root up. I am inclined to think there is some truth in their information, from the way they gave their account: they volunteered it, and, after expatiating some time on its goodness, they seemed to fear lest it should detract from the value of their own inlet, and began repeating the assurance that the Lă-ă-kine route was very good two months hence, when the snow is hard. What they say of the rivers also seems likely to be true, as, from all we can learn, a north-east line from Desolation must pass near the sources of the rivers which water this part of the country, and I believe this account agrees with the information received by the officers of the Hudson Bay Company.

Of course, should it be your wish, I shall be perfectly ready to endeavour again to ascend the Lă-ă-kine valley later in the year, though I confess I should start with the conviction that my exploration would be valueless to the colony. From Desolation I think it possible there may be a route, and I have no doubt there are one or two farther north, but I feel sure there is none from Jervis Inlet.

Of the geology, Dr. Wood says—"On the right side of the upper arm of Jervis Inlet the mountains against whose sides the sea washes give indications of being composed of porphyritic granite, the granitic rocks generally being deeply imbued with copper oxides; thin veins of white quartz are frequently seen intersecting the granite. The rocks forming the sides of the second inlet, some 6 or 8 miles distant, are more rugged and precipitous, and consist generally of a strongly micaceous quartzose granite. A mountain-stream, which we crossed on the 9th, presented in the granite and trap boulders, which formed its bed, singularly rich specimens of iron pyrites, without any observable indication of other metals. Upon another mountainous stream which we crossed I saw the largest boulder of quartz (transported) I ever witnessed; it must have been 4 or 5 tons weight, and was deeply stained on one side by the oxides of iron." Between Squawmish and Lilloet the geological features underwent no change—granite and trap everywhere and a few thin ledges of quartz;—no limestone of any kind. Dr. Wood also observes that "he saw no new specimens of vegetation, which is generally that which prevails along the coast and upon the banks of the Fraser River." Berries, which are such an important article of food with all the Indians, were not at all plentiful between Jervis and Howe Sounds, but nearer Lilloet they became very abundant, and many, especially the raspberry, very fine.

The same absence of animal life was observable on this journey as I remarked on my excursion last year. Here, where man hardly ever comes, one would think game would abound, but we only saw one deer, half-a-dozen grouse, and as many small birds. We saw the marks of several bears, and sufficient indications of deer to show us that the solitary one we had seen was not the only one in British Columbia. Of course, in this absence of vitality I do not include mosquitos, which swarm about in myriads, and torment one night and day as mosquitos only know how.

I need not speak of Dr. Wood, except to thank him for his kind assistance while he was with me. I have given his observations on the country passed over; he regrets that he had not opportunities of making any but what are superficial and imperfect.

I am preparing a sketch of my route. I have to regret that the succession of wet cloudy days and nights, and often the density of the bush, prevented the verification of the estimated distances by astronomical observations as frequently as I should have wished.

Since writing the above remarks on the route from Clâhōose, I have been enabled to obtain more information concerning it from my Indians, through an interpreter provided by his Excellency the Governor, and I find that it does not answer our expectations. Instead of going direct to the Fraser, as I understood them, it comes out on Lake Anderson; the country over which it passes is not good as they said, and it takes them nearly a month to perform the journey. This, I fear, makes this route quite useless, and these Indians do not know the country farther north. They describe the Clâhōose River as very large "like the Fraser," and that there is good land on its banks. Their description of these rivers confirms me in the opinion that the Clâhōose, Lilloet, Squâwmiht, Hoystien, and one or two other rivers, rise in the same place in the mountains, where there are several small lakes, as mentioned in paragraph 27.

I have made no remarks on the probable depth of snow in the winter on the Howe Sound route, but I do not think it likely there is much more than on the Lilloet, both having nearly the same latitude, though the elevation of the Howe Sound route is the greater. The Indians say that it is not at all deep, that it snows hard during one month (November), remaining on the ground three months, but their accounts on such subjects are always very vague. I understand that at times there are from 2 to 3 feet of snow at Port Lilloet.

XXII.—*Boat Excursion from Bangkok, in Siam, to the Pechaburri, on the Western Shore of the Gulf of Siam.* By Sir ROBERT H. SCHOMBURGK, CORR. F.R.G.S.

Read, June 11, 1860.

I HAD been suffering from indisposition for some time, and the doctor having advised a change of air and scene, I resolved to visit the town of Pechaburri,* on the western shore of the Gulf of Siam.

I left, therefore, the wharf of the Consulate on the 2nd of May last, at about four o'clock in the afternoon, in the Kala-

* Lat. 13° 36' N., long. 99° 55½' E. of Greenwich, according to Captain Richards' Survey of the Gulf of Siam.

home's * own boat, next to the royal barges the handsomest and best appointed. Its cabin was commodious, and high enough for a person of my size to stand up without bending the head; it was otherwise so well fitted up that a doubt might arise whether or not some ostentation was displayed. The boatmen were mostly Cochinchinese, who, during the war between that country and Siam in 1836, had been taken prisoners of war, and kept in bondage since. They were now men from fifty to sixty years of age, but still active, pulling their oars vigorously. The manner of propelling the boat is by standing upon the deck with the face towards the bow, the oar being attached by a rope or noose to an upright piece of wood, which is fixed to the gunnel; the cord is sufficiently pliable to act as if it were a swivel. The rowing did not seem to them a fatiguing work, for I saw them plying the oar for hours without showing signs of considering themselves overworked. They were equipped in green cloth jackets, with red collars and cuffs, and acted under an officer who would occasionally let them feel a rattan, which, as a wand of office, he bore in his hand. Songs—no doubt recollections of their own country, the measure being strongly marked by stamping the right foot on the deck—cheered them on.

Mr. T., the Consul of Hamburg, accompanied by a friend, were my travelling companions, but they were in another boat.

We passed Klong (canal) Bangbong, and entered that of Bang Kaveh. It was then nightfall. The canal became smaller and smaller, studded with hundreds of boats, laden with produce from the provinces Nakong Kaisi and Pechaburri. They awaited here a favourable tide, and having all the same destination, namely, the Bangkok market, they had gathered in such numbers that it was the greatest difficulty to get along.

The Kalahome's barge had lanterns, not only in front of the cabin, but likewise at the bow and stern, which were lighted to show distinctly the insignia of a high nobleman (namely, five bannerets with horse-tails tied to the staff below the flag), who, for all they could know, might be himself on board. It seemed, however, that even such a rank could not influence the people in the boats to make the necessary room for us to pass through until our patron used his staff of office without leniency upon the refractory who did not get out of our way,—a remedy which had evidently much more the desired effect than the paraphernalia of Siamese nobility.

Our progress was very slow, and at about four in the morning we found the canal quite narrow, and the water so low that we had to stop near a wat, or Buddhist temple, with some houses on the opposite bank, from whence a canal branches off to Nakong Kaisi.

* The dignity of Kalahome is similar to that of Prime Minister.

The tide having sufficiently risen, we continued, and entered with daylight a broad watercourse, equal in breadth to the Menam. It was a pretty sight when, on our escape out of the small canal, we entered the Thatchin, as this canal is called, bordered by bushes above which fan-leaved palms were towering, the banks studded with houses, the canal enlivened by numerous boats, in size from the small skiff to the unwieldy barge, carrying the produce and merchandize from the interior provinces to the capital. The barometer stood then 30.20 inches, the temperature of the atmosphere was 78° Fah., and that of the water 88° Fah.; showing the same difference at that early hour in the morning as under the tropics in the west. At six o'clock we arrived at a place where the canal divides into two branches: the one takes a direction to the north, the other to the west by south.

At the fork where the two canals divide, and likewise on the opposite banks, were a number of houses, perhaps from 150 to 200, with here and there a Chinese shop amongst them. The open spaces before the houses were heaped up with firewood for the market in Bangkok. This is the village Thatchin, bearing the name of the canal.

Our appearance caused some stir. Above the token of Siamese nobility the white ensign—Great Britain's prettiest colours—was flying in the Kalahome's boat, while the flag of Hamburg was waving from the stern of the boat in which were my companions. My Cochin-Chinese boat's crew sung one of their liveliest ditties, stamping their feet with extra vigour, and the boatmen in the Hamburg consul's boat set up in opposition one of their Siamese songs. The dogs in the village did their utmost to welcome us by loud barking, and here and there out of the small windows of the huts peeped the face of an astonished inmate, rubbing the sleep out of his eyes in order to stare at us. This did not give me the idea of a propensity, on the part of the Thatchin people, to rise early, for it was then already past six o'clock.

The canal which was to carry us to Meklong becomes now narrower, and takes a south-western direction. We halted for an hour at the wat Kuthia; while breakfast was being prepared we took a stroll.

Along the banks of the canal were a number of huts of mean construction, and, from appearance, untidy within, the inhabitants of which rushed out of their habitations when the furious barking of the dogs announced to them that there was something more uncommon to be seen than an everyday's occurrence. The little children playing before the huts ran frightened away, screaming lustily, just as I had previously witnessed it in the Indian villages in Guiana, when persons white of colour presented themselves; and I am sure had there been any parrots in the huts they would

have done their utmost to outdo the children in screaming, just as in Guiana.

I was struck with the great difference in the appearance of the women at this village when compared with the generality of the Siamese females. They were much fairer, and, in lieu of the short tuft on the crown of the head, they possessed long flowing black hair. Some had it neatly plaited, in the manner European ladies used to wear it in the commencement of the present century. I was told they were Muangs, or Peguans, from the Burmese boundary; but why there should be such a number in this locality, the generality so much superior in appearance to the Siamese women, while their husbands had the looks of the common male creation of Siam, I did not learn.

Fighting our way through the assailing dogs, we continued our walk along the raised pathway that traversed the marshy plains, covered with a vegetation of saline plants, by no means of great interest to a botanist who finds the same feature represented under similar latitudes where the soil favours that class. However, I noticed a *Solanum* climbing up the trees and bushes of mangrove, the flowers of which were of a fine blue, in various tints, as the light fell upon it. The people, when they saw that I gathered it, came to the conclusion that I must be a medicine-man, and told me that they used a decoction of it as a purgative.

The train of men and children that followed us increased as we went along: the urchins took confidence on seeing others following us, but the women satisfied themselves with a stealthy glance through the little square windows of their houses; or, where it happened that they were outside of their huts, they stealthily turned the head over the right or left of their shoulders, retiring with precipitation to their habitation. I was very forcibly reminded how frequently I had witnessed similar instances during my peregrinations amongst the Indians in Guiana, thus adding a new confirmation to the doctrine that unsophisticated nature is so frequently the same.

The crowd followed us to the wat. To judge from the scanty and worn-out clothing of the few talapoins which we saw there, and the small number of dwellings, it must have been a temple of but a moderate income. The priests watched our proceedings at breakfast with great curiosity, but declined to accept partaking of any of the dishes sent to them. The grounds around the wat were neatly laid out, and were kept in good order.

We were again under way shortly before nine o'clock. The country we had hitherto passed through seemed to me, judging by what I have seen in Virginia and the West Indies, to be uncommonly well qualified for the cultivation of cotton. Unfortunately

the population is so scanty, that those who wish to labour may acquire their sustenance in a more simple manner. Firewood seems at present to be the staple article of these regions. Not only did I see it piled up in heaps, wherever there was a group of houses, to be embarked in boats when opportunity offered, but we met numerous boats loaded with it to be carried to the market of Bangkok.

The heat was now rapidly increasing: the thermometer stood 90° Fah., the water in the canal was 87° Fah., and the barometer showed $30^{\circ}15$. Our course varied between south and west. We passed houses and small settlements, built on both banks of the canal. Here and there was a wat. But what a difference between the wats of the king at Bangkok and the poor buildings that we found erected on both banks of the canal, as temples and habitations of the brotherhood! The question may arise, Do not the priests or talapoins of these rural districts serve their religion better in their poverty than their lordly brethren at Bangkok?

Once again under way, there was a strong bend to the right; the water was now very low, and not only did the banks of the canal expose mud-flats on both sides, but we found it difficult to get our boats along in mid-channel. I saw but few birds. I shot a rail that was new to me, and my companions amused themselves by firing at the alligators, which, with their ugly heads just above water, lay listlessly in the stream, or sunned themselves, their slimy lengths stretched out on the mud-flat.

The canal became much narrower, and shortly after ten we passed a village with a wat on our left, and opposite to it a canal, which branched off to Maikongkosi, the great district for sugar-cultivation. The temperature had greatly increased, and as the roof of the cabin in the boat was covered with copper, the heat was almost insupportable. The thermometer showed 128° Fah. in the cabin.

We met a boat of a large size, and on inquiry I found that it was laden with cotton, and came from Rasaburi. To judge from the sample which I took, it was only of middling quality, and I learned from the owner that he expected to get about 100 ticals (calculated $12\frac{1}{2}$ 10s.) for the boat's load.

Our boatmen were obliged to use poles to propel the canoe along; it was nearly low water, and the ebb, moreover, against us. The scenery along the banks seemed that of a dismal swamp—mangrove-bushes and sedges. We saw no habitations, nor any traces of cultivation; all was still and lifeless around us: the noon-tide heat had seemingly driven even the birds away; and only now and then a solitary crow winged its way heavily along.

Our course was mostly westward. At about five o'clock in the

afternoon we arrived at a point where the canal forms a fork; one branch goes off south-west, towards the town Meklong, the other northward, to Maikongkosi.

The south-western branch, which we had to follow, had not a drop of water in its bed, the tide being nearly at its lowest ebb. There was a small village on the fork of the canal with a wat. We had here to wait until the flood set in, and, noticing a cock-pit, it was selected to serve us as a dinner-saloon.

As soon as we landed the people flocked around us. We wished to purchase fowls, but a middle-aged thick-shouldered individual seemed to give advice not to sell anything to us. He spoke authoritatively, and made himself known as the owner of the cock-pit. A slap upon his shoulder, and a hint to go away, quieted him; the more so since he had now learned from our boatmen who we were. We soon effected our purchases, and procured likewise a quantity of fine fish and prawns, and enjoyed an excellent dinner in the cock-pit. The Siamese indulge greatly in the cruel game of cock-fighting, and rear their fowls for that purpose with great attention.

The tide came rushing in about half-past six o'clock: it was a curious sight. The canal, previously perfectly dry, showed first a few rills of water, seeking their way meandering through the mud; then came a rush, and in an incredibly short time the bed was filled up, and with the stream, carried on at the rate of three or four knots, came quite a fleet of boats, which, having been peuned up while the canal was dry, now entered the broad course of the Thatchin.

We started at seven o'clock, and reached the river Meklong* in about three hours' time. Where the canal by which we came enters the river, is situated along its banks and those of the broad river the town of Meklong, distant from the mouth of the latter about 4 miles.

It was very dark, and a thunder-storm was rapidly approaching. It would not have been prudent to start to sea; we wished, therefore, to await daylight at the town. But our boatmen determined to go on for a few miles, to be nearer to the mouth of the Meklong when day should break. However an accident, which proved serious to me, brought us soon to anchor. In the darkness, and no doubt for want of the proper look out, our barge was run against the great pallisades by which the river is barricaded, in consequence of which only a small single passage is left for vessels and boats. Our barge canted over, and the tables and chairs which were in the cabin were upset, and with them my mountain barometer, by which the glass-tube got entirely smashed. I had only

* Meklong signifies "Mother of canals," like Menam "Mother of rivers."

time to save the chronometer, by rushing towards the table and seizing it before it came to the ground. This accident was annoying enough; the second boat profited by our mishap, and avoided the danger.

As soon as the eastern sky showed the approach of day, we started, and found ourselves, with the tide in our favour, at six o'clock in the morning at sea, pulling southerly along the shore at the distance of about three miles from it. The aneroid barometer showed then $30''\cdot12$, the temperature of the air was $77^{\circ} 5'$ Fah., and that of the sea 87° Fah. Inland, at the distance of about 12 miles from us, extended, in a N.W. and S.E. direction, a chain of mountains, in their outlines abrupt and broken. From the midst of them rose a pyramidal hill, its summit capped. The prospect in that direction was closed by a mountain-chain more elevated, the distance of which I estimated at from 30 to 40 miles inland. The ridges of these mountains were apparently less abrupt than those nearer to us, of which the pyramidal hill forms such a striking feature. It has been called by Captain Richards, of Her Majesty's Surveying Ship *Saracen*, the "Sugar-loaf," the Siamese boatmen called it Kow Wataploa. It is stated to be 1260 feet high. Another remarkable hill, distant from us about 25 miles, bore south-west, and served us for some time as a mark to the entrance of the Pechaburri River. The hill, judging at the distance we were from it, seemed isolated, and from its outline has probably been called the "Nipple" by Captain Richards in his chart, who states its height 1900 feet.

We followed the outline of the coast at a distance of from 2 to 3 miles, and had then scarcely more than $1\frac{1}{2}$ fathom of water. It was about half-tide: the shallows were studded with fishing-stakes. Whole flocks of pelicans, cormorants, and gulls, in the absence of the fishermen, had taken possession of them, sitting listlessly upon the gratings of the stakes, until we produced some stir amongst them by discharging our fowling-pieces in that direction: then there followed such a fluttering, chattering, and noise, that it was almost deafening.

The sea was perfectly calm—numerous fishing-boats were sailing to and fro, the sails of which, under the reflection of the morning sun, seemed white as snow. It was quite an interesting sight. Penned up as I had been at Bangkok, surrounded by mudflats and watered by a river the colour of which is that of loam, teeming with impurities—the freshness of the sea air, the deep-coloured sky, and the animation which hundreds of fishing-boats gave to it, rendered the scene before me most interesting.

Large masses of vaporous clouds, formed by the exhalation of the ground after the rain last night, were encircling the Sugarloaf Mountain, the light fleecy-white clouds capping its summit.

How glad I was to see mountains again! to me there is always something interesting connected with their aspect. Do they not form the finest feature in a landscape—or does not the geologist read in their structure a leaf of the book of Nature?

We changed now our course, and the Nipple Mountain was no longer our landmark; a hillock, crowned with a Buddhist temple, served us instead. A group of trees to the south of it, with an extensive sandbeach stretching southward (the only beach which I had noted of that nature during our voyage), was pointed out to us as the mouth of the Pechaburri River.

The entrance is narrow and shallow, and at the ebb-tide extensive mudflats, which appear high above the water, seem to barricade the mouth. At the distance that our boats were, the crafts which came sailing out of the river seemed to glide over the banks. On approaching nearer a small channel is observed, by which vessels of little size, and boats, may reach the sea. A number of such boats were lying high and dry upon the mudbank. Sea-fowls—amongst them that stately bird, the white pelican—were wading over the mudflats, apparently unconcerned at the presence of several men in search of mussels. The way in which they collect these moluscous animals is very ingenious. Of course the mud being so soft they would sink knee-deep into it at every step, and render their progress fatiguing were they to attempt to walk over the bank. They use therefore a board, about 5 feet long and 10 inches broad, which is laid flat on the mud. A pot is tied to the head part of it, and at about the middle the person who intends to secure the mussels kneels, using his hands to propel the board, and collecting the mussels which he meets on his way, he deposits them in the pot.

Our course was now west to the mouth of the Pechaburri, on the left bank of which, a short distance up the river, we saw some houses, apparently only recently erected, surrounded by a fence made of bamboo. These, we were told, had been built by order of the first king, who was shortly expected to visit Pechaburri, and were to serve as an intermediate halting-place in going up to the town.

We passed a stockade placed across the river, similar to the one which in the Meklong had caused, the previous night, the mishap to my boat. These stockades have been erected for the better security of the river against any entrance without permission.

On a kind of beach, on our left, I saw a sight that certainly astonished me. Two boats had come there to a halt, the people belonging to them being occupied in taking an early breakfast on the beach. A herd of monkeys, from fifteen to twenty in number, were observed close to the persons that were discussing their breakfast, morsels of which were thrown to them as we would do to a favourite dog. There seemed to be the most amicable under-

standing between the parties. I could scarcely have believed that these monkeys were inmates of the adjacent clump of trees, so familiar and tame did they appear with the people. But a gun being fired off by our companions in the other boat after a bird, in a different direction from the breakfasting party, how the long-tailed tribe scrambled off! and, under the most screaming noise, dexterously ascended the nearest trees, commencing to chatter at the untimely interruption. Later in the course of the day, when ascending the river, we met another group of the same animals coming down to the river-bank (the water being low), following our boats along shore for some time, until finding that we had nothing to give them, they withdrew to the bush.

The religious faith of the Siamese possesses, as one of its prominent features, the metempsychosis; hence, while averse to killing any animal, they feel the strongest reluctance to deprive of life a monkey, which, of all dumb creatures, bears the nearest resemblance to the human race, and may be the abode of a poor soul which has been wandering for ages and ages to reach perfection.

We stopped at the house intended for the royal halting-place: the ebb-tide was too strong to stem, and our boatmen clamoured for their breakfast.

The building, made of bamboo and covered with palm-leaves, had certainly nothing royal to recommend it. There was, however, the dais, only intended for majesty and his courtiers; but, as we observed that a number of travelling priests had selected the exalted place for partaking of their breakfast, we followed their example.

They watched our proceedings with curiosity, from the placing of the tablecloth upon the bamboo-grating to the arrival of the dishes sent up by our cook. We offered them to partake breakfast with us, but they declined, saying they had already breakfasted. Indeed we had seen as much; but meeting them in the royal caravansary, we did not wish to show incivility.

The talapoin, according to the strict rule of Buddhism, is not permitted to taste food between sunrise and sunset. I am aware that this rule is not strictly kept, and perhaps least so when priests are travelling. They probably enjoy their dispensation.

We started from the royal halting-place at a quarter past eleven o'clock A.M., and took our course S.S.W. towards a wat on the river's right bank.

The Pechaburri makes a bend to the right, and at that point a second row of palisades has been placed. This stockade having been passed, the village of Banlam extends on both banks of the river. I estimated the number of houses at about 500, and that of the inhabitants, from what I was told, likely at 6000.

Very few persons were visible while we passed up the river. The

noontide heat kept the people within their houses; but there were signs that business was carried on at other hours.

I noticed several establishments where huge vats for curing fish were the prominent feature, and next to it large heaps of limestones, with kilns in full smoke, showed the residence of lime-burners, while perhaps the next-door neighbour occupied himself with the manufacture of bricks.

Before others of the houses large heaps of salt were piled up, which had been gained from the seawater, and those establishments, with the Chinese shops intermediate, gave to the village signs of an activity, probably in full operation through the day, noontide heat excepted. It was, however, evident that amongst the inhabitants the Chinese element predominated.

I found that at the termination of the village the water of the river was already fresh; but it must be recollected that it was then nearly low water.

The Pechaburri became now much more winding in its course. At noon the thermometer was 93° Fahr., the temperature of the river 90° Fahr.

Our progress was very slow, and soon afterwards it was stopped altogether, the canal being so shallow. We had to wait for nearly three hours before there was sufficient water for continuing our progress; and this delay was the more irksome, as we had grounded at a place where there were no habitations, the banks of the river low and marshy, with a number of mosquitos to keep our hands employed to ward them off.

We started at half-past three: on our right, or the left bank of the river, a canal branched off to Pietoleh. It was enlivened by many boats, and the white sails of those that were under canvas would be seen a long distance inland.

The banks of the river gained in interest: there were more houses, surrounded by orchards, and here and there a spot with flowers.

The Siamese are fond of gardening: humble as the dwelling may be, an attempt at cultivating flowers—if not in the ground it will be done in pots—is a pleasing feature. The time-honoured marigold is always among them.

Rice, it seems, is the principal produce of this part of the country: a great deal of the last crop was placed in stacks around the houses and protected against the influence of the weather, very much in the same manner as our cornstacks at home.

We passed wat Kout on the right bank. The buildings were superior in construction to the others we had hitherto seen along the river, and a bridge, the first we had met with in coming up, connected both banks.

Our progress was slow against a strong current; but the objects

that presented themselves along the well-cultivated banks, or the boats which we encountered coming down the river, were of such interest, that we did not feel its tediousness, and regretted only when night set in.

It was nearly midnight before we reached Pechaburri: hence we resolved to remain quietly in our boats until daybreak, and to await the things that then were to come.

The Governor of the district sent already with dawn (much to our inconvenience, since we had had so little rest), a messenger to inform us he would be happy to show us every civility. Besides that, the Minister of Foreign Affairs in Bangkok had given me letters of recommendation: his colleague, the Kalahome, had sent a quick messenger from Bangkok to inform the Governor of our contemplated visit.

The bearer of the Governor's message was Chao Mùn Katchamat, one of the present bearers attached to the Siamese embassy to London. He spoke the English language fluently, was gentlemanly and well-informed, and of the greatest assistance to us during our stay at Pechaburri.

The King had sent him some time since to this place to superintend the new wats and residences, which, at the direction of his Majesty, were being built.

He placed, in the Governor's name, a new house as a residence at our disposition so long as we intended to stay at Pechaburri, and inquired how many horses we wanted to visit the surrounding country. He likewise mentioned that as soon as we were installed in our quarters the Governor intended to call upon us.

The house appointed for our residence was nicely situated at the river's left bank, just where it makes a bend, permitting a view up and down the river. It belonged to the Kalahome, who occasionally visits Pechaburri, and was sufficiently commodious for all of us.

We had just finished our arrangements when we saw approaching on the opposite bank a long and gay cavalcade, a person in the dress of a Siamese nobleman heading the procession. The river was easily forded; but as soon as the high personage had arrived on our side of the river, he dismounted, and placing himself on a sedan of scarlet velvet, borne by eight men, he was brought up to our residence.

There was no necessity of informing us that our visitor was the Governor of Pechaburri. Mùn Katchamat accompanied him, and served us as interpreter during the interview. His Excellency offered to render us every service in his power (thanks to the letters which we had brought from the ministers in Bangkok); but his conversation was otherwise of little importance, as he remained throughout reserved, and seemed only intent on being polite.

He requested us to attend in the evening a Siamese concert at

his house, and to dine with him next day. He dwelt emphatically upon the musical treat which was in store for us, by hearing a duet of his two best singers. Katchemat, he said, should accompany us wherever we wished to go. I observed to the Governor that before visiting any other place, we should in the first instance pay our respects to his Excellency.

Shortly after his departure six ponies, with a groom to each, were brought to our residence, all the horses nicely caparisoned; and we were told that as long as we remained at Pechaburri they would be at our service, and their fodder provided for.

We were all mounted at about four in the afternoon, and the river having been forded, the ponies once arrived on the opposite bank, they immediately broke into a fierce gallop, for they saw the direction we went was towards their home.

We reached soon afterwards a bazaar, where more prudence was necessary. I took, therefore, the lead, going slowly, and as there was not much elbow-room, those who followed were kept equally at a slow pace.

The pony which I rode took a determined start to the left, and the Governor's residence was before us. His Excellency received us at the steps; but on explaining that we should like, previous to the concert taking place, to see something of the town, we crossed, under the guidance of Katchamat, a bridge over the river, and arrived at the principal bazaar.

The market was well supplied with fish, meat for the Chinese, greens, eggs, fowls, cotton-prints, crockery, nails, and numerous other articles, strangely huddled together. The street was very narrow, and the shops and stalls in a poor condition. We had to adopt again Indian file, keeping our ponies well in hand, for they were fiercely assailed in front and in the rear by all the dogs of the place, a large number of the wretched parias amongst them.

We visited next the principal wat of the town. Some of the buildings are erected against the hill-side with terraces, from the upper one of which we had a very pretty view of Pechaburri. Mounted horse again, and leaving the town we took a broad road, leading to the new hill-residence of the first King.

A number of hills, with summits peculiarly pointed, the highest scarcely above 500 feet, rise from the plain parallel to the river, and turn afterwards in the direction of the Sugarloaf Mountain. They are isolated, and consist, as far as I have been able to examine them, of saccharine limestone. I did not observe any marble. These hills are cavernous: some are capped with Buddhist temples; others contain such within their bowels.

I noticed, while riding along on the roadside, a number of palm-trees, of the tribe with fan-shaped leaf (apparently *Borassus flabelliformis*), with large clusters of an Orchidaceous plant, just

nestling below that part of the trunk from whence the fan-shaped leaves are springing. There are very few of this interesting tribe, the Orchids, which fix their roots to palm-trees.

Arrived at the foot of the hill, we found several hundreds of labourers at work; for the King had intimated that he intended to visit Pechaburri shortly, to examine the progress that had been made. The road up the hill is in a zigzag, constructed of the saccharine limestone, the recently cut pieces of which shone as brightly as if they had been composed of crystals. Between the huge rocks of the same nature that were lying scattered on the face of the hill grew numerous trees of a yellowish-white blossomed plumeria, spreading a delicious odour. The ground below these trees was covered with flowers that had dropped, still preserving their fine fragrance. Perfumers extract the odoriferous principle and convert it into the well-known Frangipani. Here the flowers went to waste.

The buildings that were being erected had nothing royal in their structure: they were of the plainest construction, like his Majesty's halting-place at the mouth of the Pechaburri. The view from the hill is most lovely, stretching over an extensive plain as far as the sea, the river meandering through it. The prospect is bounded to the north by the Sugarloaf Mountain; to the south by the chain of which the Chulai and the triple Peak are the highest elevations; while to the west the view is closed by a long mountain-chain, stretching northward; to the eastward the eye sweeping over the gulf discovers the mountains of Anhin and Bangpra, sketched as it were in blueish outlines on the horizon. The sea-breeze sweeps over the plain, and renders the King's hill-residence cooler than its height would have warranted.

I must not leave unnoticed the trading and turn-a-penny propensities of the Siamese-Chinese, a number of whom at the foot of the hill and at various heights above it had established booths with tempting refreshments for the numerous labourers employed on the road. These hard-working men are, with very few exceptions, forced to this labour without any reward, except a pittance of victuals for their nourishment.

We returned to the Governor's residence, where we found his "corps de ballet" awaiting us. They were fantastically dressed in finery and tinsel, and amongst the ten young ladies which composed the group there were some of very good looks. They represented some Siamese love-story, explained by the chorus of singing girls, whose songs were accompanied by instrumental music—the performers remaining mute, showing merely by pantomime what they felt.

As an interlude, we had the duet which had been held out as of great attraction; but both singers, the prima donna and first tenor,

sung so strongly through the nose, that for my part I felt glad when it was ended.

The pantomime was then taken up again; but we availed ourselves of the first favourable opportunity to bid our host adieu, reminding him that we purposed to visit next day the great cave-temple, about three miles distant from the town. Hence, not to expose ourselves more than necessary to the sun, we purposed to start as early as possible in the morning. Moreover, the Governor had invited us to be present at a cart-race by bulls, which he had ordered for our especial entertainment.

The melodramatic representation was thus cut short, and I rather think to the great satisfaction of the performers, who it appeared were rather uncomfortable in their close dresses, with a temperature approaching a hundred grades of Fahrenheit's thermometer.

All of us had been of opinion that we ought to start very early in the morning to visit the mountain wat, in order to escape the heat of the sun, but that luminary had already risen a good distance above the horizon before we were in saddle. The construction of the road which we followed would have done honour to the most civilized country. About 100 feet in width, it conducted straight to the mountain which contained the wat; both sides bordered by habitations and farms. Although it was not macadamised, it was in good order, and we cantered along, excepting one of our companions who took it easy.

We met passengers on foot, sometimes in groups of 10 or 20; others on horseback; here and there an unwieldy cart, drawn by oxen or buffaloes. Numerous signs of cultivation on each side of the road showed there were some agricultural attempts: here and there the fields were interspersed with orchards.

We arrived at about eight o'clock at the hill which contains the principal cave-temple. A long flight of steps led up to a plain, now covered with grass, but which I presume during the rainy season is immersed in water. The steps leading to this place were so commodiously constructed that our ponies ascended them with the greatest ease, but arrived at the level plain just mentioned, and seeing before us steps constructed at an angle of more than 30°, we thought it prudent to dismount and to leave the horses there, although every one of us had admired the agility with which they had hitherto mounted the steps.

The hill-sides presented the same features as at the king's new residence—huge blocks of saccharine limestone, numerous plumerias, and our road strewn with their flowers.

Some of my companions felt thirsty, and water was brought to them in bamboo-cans several feet in length, which to bring at the requisite elevation to the mouth some skill had to be used.

When we had reached the entrance to the subterranean temple we had to descend by a ladder, an operation which was far from being commodious or becoming.

We had descended for about 60 or 70 feet when darkness encompassed us, and following our guides through a narrow passage, which the single wax-candle borne by the leader did not render much clearer, we entered a large dome-like cave, the light to which came from an opening above. From the roof were pending some stalactites, and the walls were adorned with idols: however, this cave would scarcely strike the visitor as anything extraordinary. It is different with the next cave, which is connected with the former by a door-like opening. The first object that strikes the visitor on entering it is the gigantic figure of Buddha, represented as lying asleep on a couch: advancing towards the centre of the cave he observes numerous mythological figures or deities of the Buddhist religion surrounding the walls of the cave, some of hideous appearance. The fine tracery of the stalactites pendant from the roof, the sides of the cave richly ornamented with carvings and sculpture, the dim light which comes from above reflecting upon the stalactitic masses, in appearance as if composed of crystals, with the statues ranged around the cave, all these features give to the whole a mystic air, to which the stillness that prevails around greatly contributes.

Another opening leads from here to the third cave, adorned in a similar style, but of less interest.

A large number of workmen were occupied in constructing a flight of steps leading from the hill-side above to the caves below. This structure of bricks was being executed at the command of the first king, to render his descent for the purpose of offering his devotion more commodious. I have already observed that his Majesty was shortly expected. I did not learn whether that flight of steps was equally intended for the rest of mankind, or whether, as heretofore, less exalted persons would have to descend by the incommodious ladder.

These cave-temples are certainly very interesting; they bear probably in magnificence no comparison to those of Ellora and Elephanta, but they are well worth seeing, even with what slight inconvenience may be connected with a journey from Bangkok. I was told of another subterranean wat, which we purposed to visit next day. However, having left Bangkok an invalid, the exertion of this day rendered me unable to carry out my intention. From the report of one of my companions who visited it, I learned that it bears no comparison to those we had examined the previous day.

On our return to the level ground where we had left our horses we remounted and turned their heads homeward. The sun had accomplished more than half its forenoon course, and shone with

all ardour upon the broad road. Mr. T., one of my companions, who, as I have previously observed, took the matter very easy, ordered his attendant to lead the horse which he rode step by step, dispensing with the fatigue on his part of holding even the bridle in his hands, and assumed the most commodious position a Siamese saddle could afford. He acted wisely: I and the rest cantered along in order to reach our quarters as speedily as possible; but, exerting myself beyond the strength of an invalid, I had to rue it, as I could not leave the house next day to visit the other cave-temples.

However, arrived at our quarters after our visit of the principal subterranean wat, a bath in the shady part of the river refreshed us sufficiently to prepare for attending the bull-race. His Excellency the Governor came in state to our residence, and, although the distance from thence to the race-ground was only 500 yards, we all mounted our horses and followed the Governor, who was carried on his porte-chaise.

The arena of the race was in front of the royal palace, bordering the grand road. We found there from 2000 to 3000 spectators assembled, composed of all classes, of all hues, which the Asiatic race represents; with heads tufted or turbaned, necks, wrists, or ankles, according to nationality, ornamented by gold, silver spangles, or precious stones.

Our arrival caused some stir amongst the multitude, and our escort having carried us to a sala, we took seats around the Governor, having wisely ordained that the cane-chairs which we had brought with us from Bangkok should be conveyed to the scene of action, to avoid our being obliged to sit down "*à la Siamese*."

At the distance of about 300 yards to the left from our sala we saw three two-wheeled carts drawn up, to each of which were yoked two oxen. The driver to each stood upright in the cart, as far forward as the vehicle would permit without placing his feet upon the pole; the reins not, as in the equine race, acting by means of the bit upon the mouth, were drawn through the cartilage of the nose of the bulls.

The structure of the cart is *strikingly similar* to the one represented in the bas-reliefs of the Nineveh remains in Layard's popular account of discoveries at Nineveh: the oxen have no trusses, and are harnessed to the head of the pole, but in the Nineveh bas-relief the reins are wanting.

Every cart entering the race had four attendants, each armed with an iron-spiked pole. There was the eager multitude all hushed in silence; but as soon as the signal for the start had been given there arose a peal from a thousand voices. Off bulls and carts went; those who had the reins standing seemingly in bold relief as if they had been formed of marble; the attendants, who marvel-

lously kept pace with the bulls, occasionally poking their poles into their sides, besides encouraging the racers by loud cries. The excitement became intense, and the bulls, once put to their mettle, soon outdistanced the attendants on foot, who remained panting behind. The first race being over, the animals were led back slowly to the starting-point, the multitude greeting the winners with loud cries. The same animals repeated the race twice more, under still greater excitement of the spectators, and when it was found that the same pair of animals were the winners throughout, they were received opposite the sala which the Governor and we ourselves occupied with roars of applause: they were caressed by the owner and his friends, scarfs and kerchiefs (strange as it seems, but so it was) were waved, and all who could come near the winners patted them. During all that time those who guided the oxen remained standing upright, without even dismounting from the cart, during the short rest which was allowed to the animals between each race. The course I estimated at about 600 yards, and the speed at which the animals went with the cart from 8 to 10 miles per hour.

It was certainly a novel and interesting sight, and caused in its way as much enthusiasm and excitement as may be witnessed at our Epsom races on Derby days.

We returned in the same order that we arrived, and thus ended my excursions in and about Pechaburri. I had probably overrated my strength as an invalid, and found myself next day scarcely able to leave my couch.

We commenced our return journey on the 9th of May, at noon: the river was much shallower than we found it on our ascent. We got frequently aground on sandbanks, and did not reach the "Royal halting-place" at the mouth of the river until the evening. Here we remained until half-past four in the morning, and, profiting by the calm sea which generally prevails at the early hours of morning, we arrived at the mouth of the Meklong at about eight o'clock. We had, however, a strong current against us, and two hours were required to make about four miles, when we halted near the fort of the town to await a more favourable tide.

I entered through the low gates of the fort, and found myself at a quadrangular place, surrounded by breastworks, the walls mounted by iron guns and some mortars. On a column, the name of the fort was engraved in Siamese characters, and under it the following, in letters of the Roman alphabet:—"Pomphi Khat Khasuk. Artillery, 1834, November, Monday." To judge from this inscription, the predilection for the English language seems to have prevailed already previous to the advent of the present kings to the throne.*

* I have since learned that the second king, then Commander-in-Chief of the Siamese Artillery, had the fort constructed and the column erected.

We left the town of Meklong soon after noon, and entered the canal which connects that river with the Thatchin a quarter of an hour afterwards. The river presents at that point a fine sheet of water, its course being s.s.e.

Both sides of the canal are studded with habitations: amongst them I noted a house on our left which had quite a European appearance, the windows being closed by green jalousies. Beyond it was a large wat.

The canal, narrow as it is, continued winding in short reaches. A large number of rafts of bamboo, destined for the support of the floating-houses at Bangkok, were a great nuisance to the progress of our boats: they usurped nearly the whole breadth of the canal. Still, should we come even in contact with them, the danger for our boats was not so great as that which the unwieldy loads of sappan wood offered which we had to pass, stowed in equally unwieldy barges.

The large piles of that dye-wood (the produce of a large tree, called by botanists *Caesalpinia Sappan*), which I noticed on the banks of the canal, shows that it forms an important article amongst the exports of the district. There seemed on the whole a good deal of industry prevailing along the banks of the canal; amongst other signs of it, we passed several establishments for burning limestone. The rock is not found "in situ," but dug out of the low level ground of the vicinity: in some instances, to judge from the weather-worn appearance, it must have been lying on the surface of the ground.

I could not help noticing again the scarcity of the feathery tribe. Most prominent were, on the other hand, the crustaceæ; numbers of crabs and their allied genera were seen crawling on the shallow shores during the retiring tide.

The water was so low at four in the afternoon that further progress was not practicable. At half-past eight in the evening the flood-tide set in, but not in the manner I have previously described, and with daylight we found ourselves in the Thatchin. We stopped soon afterwards at wat Monkong to allow our crew some hours of rest. Opposite to the wat, the canal Klong Naktulla joined the Thatchin, coming from the n.n.e. This affords communications with the cultivated part that lies between the Menam and the Thatchin.

The wat Monkong showed that the brotherhood took care that it should present a good appearance. The sala was ornamented by paintings *in fresco*; the most remarkable of which was the representation of a vessel, tossed by the stormy waves of the sea, with the consternation of the crew at the danger, visible as depicted by the artist, and a man overboard; a monster, very much like a whale, its enormous jaws open, ready to swallow the poor wretch!

Is it not remarkable how frequently we find biblical accounts repeated, either in writing, where written language exists, or by allegorical representations—the latter principally amongst those nations where Christianity does not exist?

Before this sala stood two noble taxus (yew) trees. I think the first which I have seen of that kind in Siam.

We started at nine in the morning, and about half an hour afterwards we passed another of those internal water-communications, which may be considered in the shape of our European "by-ways on land." It was Klong Kan-aho-wah, connecting some part of the lower Menam with the Thatchin. A short distance beyond it entered from the left (or north-west) Klong Kokam, affording to the people of Talat Khuen a water-course, to communicate with the Thatchin and with Bangkok. A little beyond that point came from the left another canal, constructed for the facility of offering to the people of that district an easy water-communication by canals with Bangkok, which, of course, is the great mart for the produce of the kingdom of Siam.

We now followed the fine broad waterway of the Thatchin, passing populated districts, with signs of cultivation on both sides of the canal.

At about ten o'clock we turned sharply to the left and entered the narrow canal, which, at the first evening of our starting from Bangkok for Pechaburri, had caused us so much trouble, partly by the numerous boats that blocked it up, partly by its low depth.

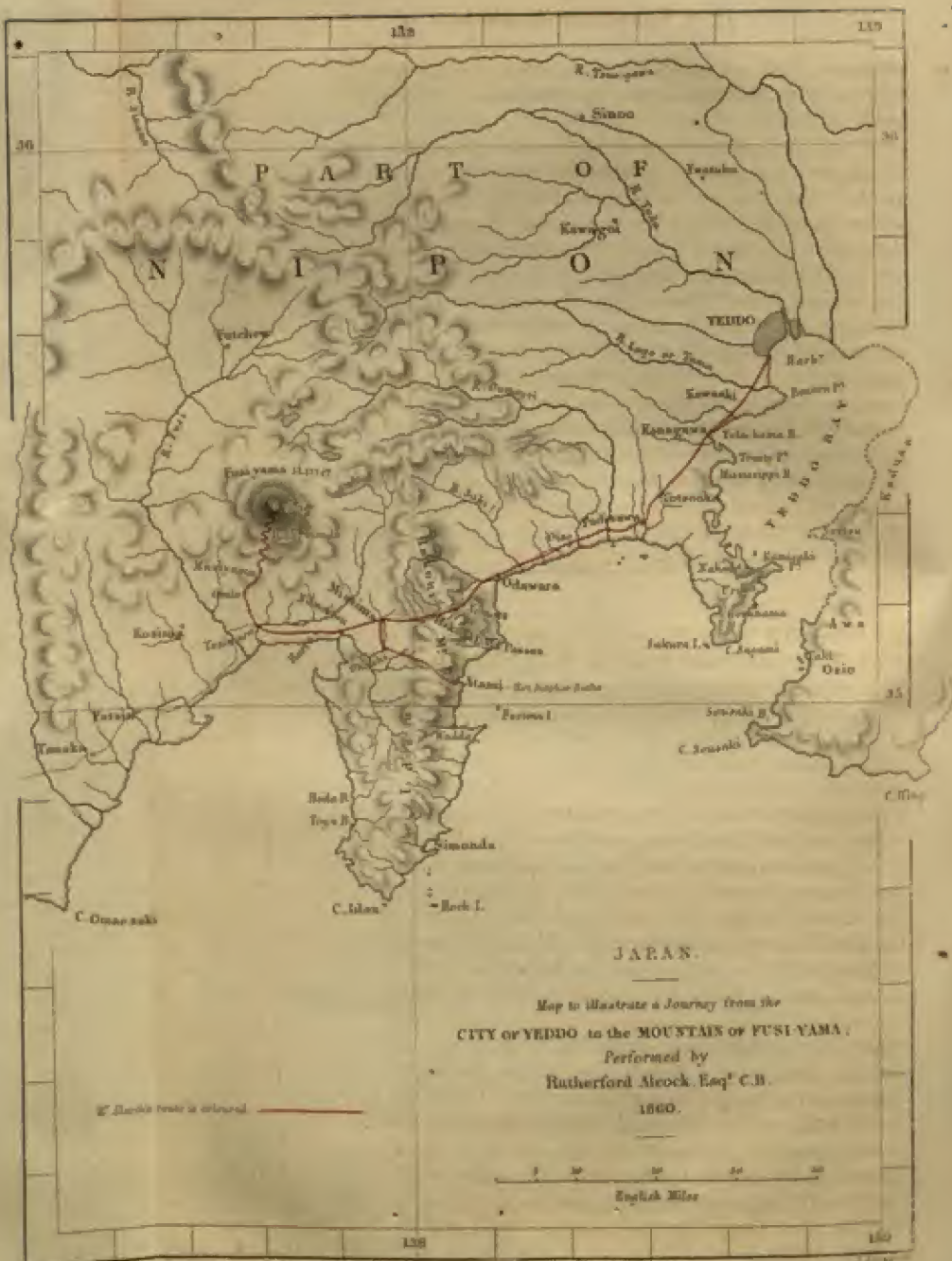
The monotony of the scenery which banks clothed with mangrove had offered for several hours of our progress was nicely interrupted by our arriving at a place where numerous houses on both sides of the canal, and boats lying in front, gave to it a kind of industrial appearance. I was told that the name of this settlement was Smadom. The wat at this village was of rather better construction than those we had hitherto seen in the country districts.

The canal was much winding: its general course was, however, north-east, our direction towards Bangkok. Soon after we reached the junction of the canal Bangoboon with the Bangbon; the former coming from the south and the latter from the north. We followed the Bangbon, passed the wat Sarabon on our right hand, and shortly afterwards the small village, Banglan.

My boat was far in advance of the other, and as the water ebbed rapidly I halted at wat Pohoh, with the intention of awaiting here the setting-in of the flood. The wat was very neat and the sala comfortable. The grounds were kept in excellent order; altogether it seemed a most eligible halting-place. However, my companions, on coming up, thought differently and passed on, and I followed their example, to my regret; for scarcely had we advanced 150 yards

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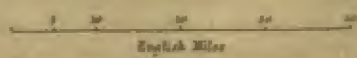
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JAPAN.

Map to illustrate a Journey from the
 CITY OF YEDDO to the MOUNTAINS OF FUSI-YAMA.
 Performed by
 Rutherford Aleock, Esq^r C.B.
 1860.

Y^e Route here is coloured.



when our boats grounded in the mud, at a place where any communication with the banks was impracticable in consequence of the mud.

It was then about three o'clock in the afternoon, nevertheless we had to await midnight before the boats were again afloat. I regretted that even by the danger of losing the companionship of my fellow-travellers I had not remained at wat Pohoh, for, although their boat was only a couple of hundred yards in advance, we could not communicate with each other.

I arrived at the Consulate in the morning of the 12th of May, at half-past 4, it having taken us more than four hours to make a distance of about three miles, the time having been principally employed in making our way through a similar phalanx of market-boats to those by which we were obstructed on the former occasion.

Notwithstanding the indisposition of which I suffered during the latter days of my stay at Pechaburri, which in some degree marred my pleasure, I enjoyed the trip so much that I shall endeavour to return with more time and a better stock of health at my disposal.

XXIII.—*Narrative of a Journey in the Interior of Japan, Ascent of Fusiyama, and Visit to the Hot Sulphur-Baths of Atami, in 1860.* By RUTHERFORD ALCOCK, Esq., C.B., F.R.G.S., Her Majesty's Envoy Extraordinary and Minister Plenipotentiary in Japan.

Read, May 13, 1861.

THE empire of Japan has so long been a sealed book to the traveller, and still continues so effectually closed to all except a few privileged Europeans residing as diplomatic agents at the court of the Tycoon, that a short narrative of a journey into the interior, in the autumn of last year, may not be unacceptable to the Fellows of the Royal Geographical Society. Not only was the sacred mountain of Fusiyama, so celebrated in Japanese story, ascended to its summit, some 14,000 feet above the level of the sea—and hitherto untrodden, so far as is known, by European foot,—but the whole route over the mountain-range of Hakoni was explored at leisure for the first time. The botany of this region was only partially known by the descriptions of Kämpfer and Thunburg, who traversed them (shut up for the most part in their norimons) upon two or three occasions on their way to and from the capital, when the Dutch factory sent their triennial tribute to court. Subjects of study to the botanist and geologist abounded in the field of Nature, and the student of life and manners could not fail to find much as

interesting among a people so singularly secluded from all contact with the outer world, as the Japanese have been during the last two centuries. There was much that was new and suggestive. Perhaps no people of the present day have excited so strong an interest; and enhanced as this may have been by the difficulty of gratifying any legitimate curiosity, it has certainly not owed its origin to this cause alone. The partial glimpses obtained by the Dutch, in their periodical journeys to the capital, of the civilization the Japanese had attained by their own unaided efforts, and of the elaborate if not perfect system organised for the orderly government of a country teeming with a population entirely self-sufficing, were all the more tantalizing that they presented to the mind problems, social, moral, and political, of the highest interest, without furnishing the needful data for their satisfactory solution. That a people should have attained a state of civilization, rivalling, in many of the arts of life and government, that of the most advanced nations of Europe—not only in spite of their utter isolation, but, according to their own opinion, by reason of such seclusion, and without a desire to change this condition for any other—was itself a great problem. How this should come to pass, with evidences of great material wealth and national prosperity, founded on the most exclusive policy ever conceived, and carried out, century after century, with unflinching constancy and completeness, was a problem for the political economist to solve.

Taiko-Sama, who died in 1590, after shattering the power of the great feudatories and all those independent princes who threatened, by their possessions and great individual force, to prevent firm union under his rule, laid a new foundation for the present edifice. But unless the material well-being of the nation had been well cared for at the same time, though under stereotyped forms of an unvarying character, and to the exclusion of all save a small privileged class from political power or action, it could hardly have endured so long. The empire which Taiko founded, in spirit as in outward forms, has remained to this day as he left it, and, for aught we know, is as firmly rooted in the habits and affections of the people as any form of government or dynasty in the Western world.

But many other questions not less interesting are suggested by the present state and the past history of Japan, and some especially perplexing to the political economist. This mixture of the Asiatic type of permanence, with its polygamy and idolatry, as these flourished in the days of the patriarchs—and, if not a progressive civilization, an aptitude for progress in the nation which is altogether European—seem alike unique in the history of a people since ancient Greece furnished a type of an Asiatic origin, with an equal capacity for war and the arts of peace, and a mental development

found only in nations of European stock. The spirit of national independence and haughty pride, natural perhaps to islanders who have never been conquered, while separated only by a narrow sea from the vast empire of a Tamerlane and Genghis Khan—the latter of whom they defied in his strength—is still a leading feature at this day. Strange in its development, chiefly because observable side by side with a thoroughly Asiatic servility in the individual whose knees do duty for his feet, and who, in the presence of a superior in rank, lays his forehead in the dust without reluctance, and shows his respect by going upon all fours or sitting on his heels, as only Chinese and Japanese can, indeed remind one of some of their own puzzles, in which they naturally enough perhaps excel, where the most contradictory and impossible conditions are imposed upon the unfortunate who seeks to evoke a definite result out of a seeming heterogeneous combination of things having no affinity or proper relation to each other.

Nature seems to have taken the part of the Japanese against the political economist, for certainly within the narrow limits of this little group of islands, not larger in area than Great Britain and Ireland, and at least as populous, everything they really want or desire is produced. The rice, sugar, cotton, and tobacco of the tropics—the silk, tea, and oranges of the less torrid zones—the wheat, potato, and grape of the temperate latitudes, all are here; and over the surface of their hills and valleys, where plenty fills the lap of the peasant with agricultural produce, the pine, the cedar, and the oak flourish luxuriantly, and clothe his mountains with a beauty of their own, unique in its character, intermingled as these are with the Eastern palm, the banana and the bamboo. In other climes, where Nature is bounteous in her gifts, it has generally been found that man forgets to labour, and sinks into effeminacy and sloth; but in this country of paradoxes the universal experience is reversed. A more laborious, patient, or industrious people nowhere exists. The most sterile and ungrateful soil was never blessed, under a stern law of compulsion and necessity, with a more painstaking race.

Luxuriance and variety in the products of nature would seem naturally to foster a certain tendency to luxury in the habits of the people, especially where landed estates and accumulated wealth exist, to be inherited by a large and privileged class, to be transmitted from generation to generation; but here the premises exist and the conclusions are different. From the highest to the lowest a marvellous simplicity is to be observed in their habits, and they pride themselves upon it as the best guarantee against lavish waste and its consequence, abject want. No present is ever given, without being accompanied by a piece of dried fish or seaweed—such as I send with this paper, just as I received it from the head priest of

Omio—to remind the receiver that they were once a race of simple fishermen, and by frugality and temperance became a great nation. Hence, between the Daimio, with 10,000 retainers at his back, and a revenue of a million *hokkos*, or measures of rice (their ordinary mode of estimating revenue), and the peasant or artisan, who earns his two *tempos* or sixpence a-day, there is probably less difference in all the essential conditions of their material existence than in any other country where civilization has massed a people in cities and towns. Rich and poor alike dispense, by habit and by choice, with all furniture, which is to them but an encumbrance and superfluity. Tables, chairs, sofas, bedsteads, all are banished. A Japanese house consists of a variable number of rooms, the walls papered, the floor matted; a hole in the centre of the sitting-room for the poorer classes supplies a grate, in which a little charcoal is burned, while above a kettle is suspended for the *pot au feu* when needed, and in the cupboard a few cotton quilted counterpanes at night supply them with beds and coverings in one. A few lacquer and china cups, and a tray or two with a number of saucers and as many dishes, constitute the whole furniture and household goods of a Japanese establishment. Their clothing consists, in like manner, of a cotton-gown and trousers or petticoat, of fashion strictly regulated by law and custom; their food of a bowl of rice, with some stewed fish and pickled vegetables, seasoned with soy made from their own beans. Now, between the richest and the poorest, the only essential difference consists in the size and number of the rooms or elegance of the papering, and the addition of a lacquer-stand for the swords of the chief of the house. Silk and gauze take the place of cotton in the clothing. The rice may be of somewhat finer quality, and the lacquer or porcelain more precious; but the meal and mode of life are essentially the same. Perhaps we have here one of the elements of the absence of discontent in the mass, and peculiarly stationary character of their government and institutions. With Europeans, the acquisition of wealth ever seems to prompt the possessors to devise new means of enjoyment, and hence a restless and perpetual desire for change and novelty, which always produces a violent contrast between the very rich and poor. Nothing of the kind exists here. As their fathers lived and died, so are they content to live and die. The schoolmaster, who so often leaves discontent behind him, has not “been abroad.” As they fed, amused, and clothed themselves, so do their descendants, with comparatively little distinction between rich and poor; and the last thing that seems to enter into the mind of a Japanese is to do anything different from what has been done before as regards his mode of life. They are trained in this habit of thought, and if it is not their original, it has certainly become their second nature. What can a man do with his wealth, then? He may have more houses and gardens—

more servants or retainers—make to himself more wants (although that is not easy on such a system); but he cannot live in more than one house at once, nor eat more dinners, nor wear more clothes; and the habits and sumptuary laws, which exclude all the vagaries of fashion, leave them no outlet for extravagance. After all, Balzac was quite right when he said that even Napoleon, with all the means once at his command, could not exceed the limits of enjoyment his organization enabled him to absorb between the occiput and the soles of his feet any more than humbler men; and where these are limited by national custom and habit to the gratification of sense with domestic duties, it is difficult to multiply them. If wealth itself does not become a care and a burden, in accordance with the old Spanish proverb, "*Quien tien oriados tien cuidados*," wealth can add but little to the happiness of a Japanese. The greatest marvel of all, perhaps, is the fact that this people, who ought to be sinking perceptibly in the scale of nations, are not following this course at all. Since Kämpfer wrote of them, with such painstaking minuteness and general fidelity, now some 270 years ago, there is no sign or symptom of decay, or even of their having retrograded. As the population must have increased, it follows that production must also have kept pace, or where we now see plenty there would be misery. Have they found out the secret, more inconceivably impossible than the philosopher's stone, of standing still and yet not deteriorating as a nation—neither advancing in a dangerous line of progress, nor retrograding on a still more perilous gradient of descent? The Chinese have striven after this secret two thousand years and more—nay, since Confucius lived, six hundred years before Christ, and inculcated the principle; but sorely have they missed their aim, going backward lamentably and perceptibly down into a state of disorganization and chaos. Not so the Japanese. Since Taiko Sama's day, who died in 1590, we can trace no organic or fundamental change, outward or inward, in habits of thought or action—in government, laws, or institutions—in customs or language—nay, not even in costume! Yet are they in full vigour as a people. No signs are here, as in China everywhere, of decadence, disorder, and effete virility. Here no temples or public buildings are ever seen dilapidated and falling into decay; no canals blocked up by mud, no roads impassable. Signs of dilapidation are never permitted to appear even in private dwellings or property. There is not a hedge in the country-lanes that is not carefully clipped and looked to. Many may have little to spare; but, frugal and careful of small things, the peasant and the farmer seem alike to have nothing to fear from want. With such tangible results before us, wherever we turn, in this land of peace—an appearance of contentment among the masses and palpable signs of material prosperity everywhere, be their creed, their policy, or their political economy

what they may,—the European traveller cannot help feeling that certain results are achieved by this far-distant Eastern race in their long isolation, which the most advanced of Western nations would be glad to secure for themselves, could they but see the way. With all our advantages of Christian teaching, intellectual culture, advanced political economy, and statesmanship, we are yet immeasurably distant from the desired end. Such a nation must, at least, be worthy of careful study, and likely to reward the most patient observation.

In sitting down to give some account of my travels through a part of the interior of this kingdom last autumn, adding such commentary as a long residence may suggest, I have little hope of throwing light on many of the paradoxes and problems which the present aspect of Japan, taken in connection with what we know of its past history, must present to the mind of the least reflective; and perhaps even this train of reflections might have better been indulged in, if at all, at the end, rather than as a preface to the observations I wish to bring before the Society, on the social state and physical geography of the districts traversed. But as they arose spontaneously when contemplating my line of route, and the notes it supplied with a view to select such materials only as might prove most interesting, so may they perhaps serve to suggest a bearing or a meaning to many of the incidents of travel which might otherwise appear trivial or wholly uninteresting; and this is the more essential as I have no "hair-breadth 'scapes by land or flood" to relate, wherewith to enliven the plain narrative I have to give.

Various causes had delayed my departure from Yeddo (the capital of the Tycoon, rather than of Japan) until the Japanese ministers confidently predicted that it was too late to accomplish my proposed ascent of Fusi-yama. August was already over, and the first days of September were upon me while yet engaged in removing the obstacles raised by the ministers in the first instance, and admirably developed subsequently by their agents with that felicitous persistence and fertility of invention which if it does not always secure them success would, in a better cause, certainly deserve it. There are but two months in the year, usually—July and August—when the mountain is sufficiently free from snow to permit the ascent: so at least the Japanese, who go to this cloud-wrapped shrine of their gods in crowds every year, assert; and, from my own experience, I should judge it well-nigh impossible to make the ascent after much snow had fallen. But though they go in crowds, strangely enough, it is only the poorer classes. It is not considered consistent with the dignity of a daimio, or even an officer of any rank, to make the pilgrimage,—perhaps because too many of the greasy mob must unavoidably "come 'twixt the

wind and their nobility." Be this as it may, that was one of the objections strongly urged by the ministers. "It was not fitting in a person of the rank of a British Envoy to make the pilgrimage, limited by custom, if not by law, to the lower classes!" If it be asked why the ministers were so averse to my giving effect to a plain stipulation of treaties by which the head of a diplomatic mission is secured right of residence in the capital and the free right to travel all over the empire, I can only reply that there are many reasons apparent enough, but which may have been the most influential of these is quite another question. No doubt the whole policy of the existing rulers is to limit and restrict, as far as possible, all locomotion of foreigners and all intercourse with the natives commercial or social. The infiltration of European ideas, principles, and habits of thought, felt to be antagonistic and subversive of those heretofore prevalent, is not, in their opinion, a desirable consummation, and, so far as in them lies, it will be prevented. Of this I can have no doubt; and with this ever-present feeling and guiding principle it is not to be wondered at if they have from the beginning spared no effort to create impediments, and surround the foreign representatives especially, who by treaty and diplomatic usage could claim so much more latitude of action than any others, by a sort of *moral quarantine*. It has only been by a series of well-contested battles, in which much strategy has been displayed on the Japanese side, that it has been possible to secure any semblance of liberty in the capital, where, to say the truth, our presence was and is particularly unpalatable to all the ruling classes. It was first attempted to bar all travelling by land to the port at Kanagawa, some 16 miles distant. Then, under pressure of alarm at the danger of disaffected persons doing us personal injury, it was sought to confine the members of the several legations for an indefinite time ("until the country was more quiet") within the walls of the residences assigned them. To this day no Japanese of education or station can pass within the gates unless actually employed by the Government; nor, indeed, can any Japanese servant, workman, or merchant without a licence, for which, if they have anything to sell, a black-mail is levied. Despite all difficulties, this first attempt on the part of any foreign representative to make the treaty clause securing right of travel a *reality* succeeded, and on the 4th of September a party of eight Englishmen started from the British Consulate at Kanagawa, which being a day's journey on the road had been made the rendezvous. Besides the permanent staff of the legation, I had the advantage of being accompanied by Lieutenant Robinson of the Indian Navy, provided with instruments for the purpose of scientific observations, and a practical botanist in the person of Mr. Veitch, a son of the well-known nursery-

gardener in Chelsea. This I deemed especially fortunate, as Sir William Hooker had written to say it was an object of great interest to botanists to learn something precise of the mountain vegetation of Japan, and especially of Fuziyama, of which absolutely nothing was known. I felt it no breach of treaty to attach temporarily to the legation such provisional members, nor did the Government take any exception, or attempt to limit in any way the number of my suite. Travelling in Japan, unless as a pedestrian and according to the fashion of the unprivileged classes of the Japanese, is not altogether a simple matter. Especially is it not so when a large party of Europeans go together, and intend to be away some weeks. Every additional unit added to the number involves transport and commissariat arrangements, which seem to increase not in arithmetical but in geometrical rates of progression. Accordingly, before I mounted myself, I saw, to my dismay, a seemingly endless line of baggage-animals and led horses issuing out of the gates, accompanied by their keepers, lengthened out by servants and followers of every possible denomination, who, under every imaginable pretext, had attached themselves to the party. The expedition had evidently risen in popular favour, once the obstacles of the authorities had been put aside. To make a pilgrimage to Fuziyama is an act of virtue with the natives, to which deliverance from misfortune and sickness attaches; and an opportunity of doing this at my expense instead of their own, enjoying a vacation at the same time with good wages, was altogether too much to be resisted. Even the Government officials ordered to accompany me, and my most troublesome impediments, at last found out that I had chosen a "propitious" time for my expedition, and evinced the greatest alacrity when it became inevitable and their part of obstructors had been played out. So that it was perhaps fortunate, on the whole, that my commissariat did not take the proportions of an Indian detachment on a line of march. Although I had expressly stipulated for the absence of any parade, and desired to dispense with an accompanying escort, wishing, on all accounts, to travel as much as possible in a private capacity, the Government, declaring anxiety for my security along roads they persisted in considering dangerous, made the company of a certain number of officials inevitable. A vice-governor, three or four yacouns (officers of the Government, entitled to wear two swords), and of course an "ometsky," or spy, to watch them, if not me—more probably both—made up my escort. These all being gentlemen of a certain dignity, each had their norimons (the palanquin of Japan), with bearers and attendants, flag, umbrella, and spear bearers, who, added to others, made a cortège of at least a hundred persons, with more than thirty horses. As my eye followed them along the road, nearly as far as I could

sec, I sighed involuntarily to think what I was undertaking, having had some experience of travelling in the East, both in its cares and costs, and under similar conditions of a large following. In truth, it had required some effort on my part to face the inevitable troubles, and, without a political object which I deemed of some importance, I should perhaps never have started. But it was a question whether the clause of the Treaty giving unrestricted right of travelling to foreign representatives residing in the capital was, like so many other stipulations, to be regarded as a dead letter to all practical purposes. It so happened that neither I nor any of my colleagues hitherto had found leisure or inclination to put it to a practical test and give it effect by undertaking any expedition. American, Dutch, and Russian agents had travelled, on more than one occasion, along the high road from Nagasaki or Hakodadi, on their way to and from the capital for purposes of negotiation, as the Dutch formerly to carry tribute. But a journey into the interior, undertaken for the avowed purpose of recreation and observation, and out of the beaten track, in the exercise of a treaty-right, was yet an unheard-of thing. The difficulties and obstacles I encountered, though not on the whole more than experience had led me to anticipate, were at least many and tiresome. Sometimes the pleas put forward for delay or abandonment were amusing. At first, it was the unsettled state of the country and the risk of venturing so far from the capital and seat of government. Then it was too late in the season,—nay, at certain times, the mountain opened in huge fissures and swallowed up the incautious traveller! Even when all hope of absolutely stopping me must have been lost, it was found a great “*missouri*,” or feast, was going on, and the roads would be filled with drunken and desperate characters, so that, at all events, “I must defer my departure a few days.” This conceded, the preparations went on; and it was somewhat remarkable that, from this moment, having made a good fight and been defeated, they seemed to accept the result as inevitable, and “ate their leek” with no bad grace after all. Indeed, from the hour of my leaving Yeddo to the day of my return, after a month’s absence, I met not only with no further obstruction, but, to all appearances, everything was done by the officials accompanying me and the Government at Yeddo to make my journey both pleasant and safe.

The prospect of fine scenery, change of air, and an experience of the sulphur spa of Atami, with a quiet sojourn by the sea-side—all of which were in the programme—might have been sufficient, but I wished especially to ascertain for myself whether there was any foundation for the never-failing assertion of the ministers, that the “country was in an unsettled state,” owing to the increased dearness of everything, caused by the sudden demands of foreign

trade; I wished to have the opportunity of judging whether the alleged excitement and hostility towards foreigners, in consequence of the newly-contracted foreign relations and departure from the ancient policy of seclusion and isolation, did or did not exist away from the centre of government; and this personal observation could alone supply while travelling leisurely through the country. It is true, I ran the risk of encountering disagreeable evidences of the power of the rulers of Japan to verify their own prophecies; neither did I overlook the circumstance of such a journey offering a great temptation to convince me by facts of the accuracy of the conclusion they were so anxious to impress upon me,—namely, that such was the state of public feeling that our own safety, not less than that of the Government, required a modification of existing treaties, so far as the opening of additional ports was concerned. But these were risks to be deliberately incurred in view of the importance of obtaining some independent means of judgment and the chance of doing so which such an expedition far from the centre of government afforded. And I had heard so much of this potent hydra, which stood in the path of all advance, warning the foreigner off with threatening voice, that I was strongly moved to take a voyage of discovery in pursuit of some more tangible evidence of its existence than had yet been afforded me.

The route to Fusi-yama from Yeddo skirts the coast for some 50 miles, crossing here and there a peninsula. The Tocaïdo, a great high-road to the capital, winding along the coast from Nagasaki and other towns south of Yeddo, was open to us as far as Yosiwara. By this road all the daimios, whose territories lie in this direction, yearly travel to and from the Court for a forced residence of six months; and the mountain-passes of Hakoni, through which it leads, are strictly guarded, to prevent arms being carried towards the capital, or wife or female child belonging to a daimio being smuggled out with him, as these remain hostages during his return to his territory. The day's journey for these magnates of the land, who travel with an immense retinue of retainers (sometimes several thousand), seldom exceeds 20 miles, and more generally 15 is the limit, or from 5 to 6 *re*, a measure of about 4700 yards, or between 2 and 3 miles. At the several towns where they usually halt there are a certain number of honjins, houses of entertainment, reserved especially for daimios and Tycoon's officers; where they put up for the night. These are generally kept by some servant or retainer of the lord of the district, who will either, as the innkeeper, supply the usual food from the kitchen attached, or the traveller's servants can prepare it or purchase it from a neighbouring inn for their master. These houses are generally spacious, clean, and empty; furniture being looked upon as an unnecessary encumbrance. The clean matted

floor supplies at once a seat, a couch, and a table. Wadded counterpanes, and even mosquito-nets can generally be supplied for sleeping. A bath-room, sometimes two or three, with conveniences of every kind adjoining, may be invariably counted upon, and are models of cleanliness. In these respects the Japanese are in a condition to give lessons to Europe. We always found prepared, on our arrival at the house selected by the officer sent in advance, a bath of hot water and another of cold: the first to bathe in, and the second for cold douche, on stepping out, to brace up the relaxed fibres. The principal apartments are at what may strictly be termed the back of the house, situated, as this always is, between *cour et jardin*—the courtyard in front and the garden at the back; and, whatever be the space allotted, a garden of some kind is always to be found. Though only a few square feet sometimes, there will still be a miniature imitation of a wilderness of dwarfed trees, rockwork, lake, and lawn. These are indispensable in all; and in some, where the space is less restricted and the vicinity to mountains aids the artist, there are cascades brought over ledges of rock, subterranean caves, with gold and silver fish passing in and out, and trees of every variety of hue and shape, including the pine, the yew, bamboo, and a long list of flowering shrubs, among which oranges and camelias are common. Immediately after arrival the landlord appears in full costume, and, prostrating himself with his head to the ground, felicitates himself on the honour of receiving so distinguished a guest, begs to receive your orders, and that you will be pleased to accept a humble offering at his hands, generally a little fruit, a few grapes, or oranges; occasionally two strings of eggs,—that is to say, a couple of rows of these, curiously twisted and packed into a rope of fine straw. Due thanks having been given, he disappears, and you see no more of him or his servants, if, as usually happens, the guests bring their own and do not require help, until the foot is in the stirrup, when he makes another formal salutation, with parting thanks and good wishes. I mention these details now, because once given they apply to the whole journey: the house and garden may be a little larger or smaller; the paper on the walls and screens which divide the room a little fresher or dingier, but all the essential features are stereotyped from one end of the kingdom to the other. I was frequently puzzled, at a few days' interval, to tell whether I had been in the same quarters before or not, there is so little to individualise either the landlord or his accommodation.

At last we were fairly on our way and our pilgrimage to the far-famed Fusiyama—"Mons excelsus et singularis," as Kæmpfer describes it, "which in beauty, perhaps, hath not its equal." It may be seen from Yeddo, a distance of some 80 miles, on a bright

summer evening, lifting its head high into the clouds, the western sun setting behind it and making a screen of gold, on which its purple mass stands out in bold relief; or early in the morning, its glistening cone of snow tipped with the rays of the rising orb; and in either aspect it is certainly both singular and picturesque, springing abruptly from a broad base into an almost perfect cone, truncated only at the extreme pinnacle and towering far above all the surrounding hills. To the Japanese, who are anything but cosmopolitan, it may well be the "matchless;" for which, as Kämpfer goes on to say, "Poets cannot find words, nor painters skill and colours, sufficient to represent the mountain as they think it deserves."

Our route is pretty accurately laid down in the rough tracing sent herewith of a native map, which, for want of tracing-paper, has been drawn on one of the Japanese oil-paper cloaks we purchased on the way. But I also forward a native map of the four districts, in one of which is Fusiyama. During the first day, the road lay over a succession of hills, of no great height, but from whence a fine view was obtained over the cultivated valleys on either side, with a background of mountains to the westward, among which Fusi (yama being merely the Japanese for "mountain" or "hill") soars conspicuous in solitary grandeur. We passed through many large villages, and the town of Totsooka, where we halted for breakfast. The second day carried us over a plain skirting the sea from Foodisawa to Odawara, before reaching which we had to cross the river Saki; and some distance from the entrance of the latter place a guard of honour, sent to meet the party by the daimio of the territory, preceded us into the town. Sakikawa (kawa, river) is nearly as celebrated in Japanese art and story as Fusiyama itself, although less frequently the ornament of teacups or cabinets. I send herewith a few rude illustrations of both, which may further serve to show that the lithochrome process, so recently brought into perfection with us, has long been familiar to them in its ruder forms. This river descends abruptly from the neighbouring hills, which lie at no great distance, and divides into two branches as it approaches the sea, spreading wide across a pebbly bottom. It appears to be subject to such sudden freshes in wet weather and on the melting of the snows, and such increase of violence as well as width, as it rushes over its flat bed, that across one of the branches it has been found impossible to maintain a bridge. The consequence is, that lying across the main road to and from the capital, a large body of porters—strong, brawny men, innocent of all drapery except a loin-cloth—are always in attendance to carry the travellers across: the commoner sort on their shoulders pickaback; the dignitaries, male and female, on short platforms, borne by six men, who are

linked together by their arms crossed over each other's shoulders, for greater steadiness, of which a picture will also be found among the specimens of native art. It would seem a tolerably lucrative monopoly. However, it has its drawbacks: for they are made responsible for the safety of their passengers, and if any accident happens to their burdens they have nothing left but to drown with them, for no excuses are taken! If railroads could only be placed under the same system, excursion trains might perhaps become safe. Accidents are, at all events, unknown here; partly, no doubt, because when the waters swell, these experienced men at the ford, in view of their responsibility, refuse the passage; and it occasionally happens that travellers on each side are detained several days, looking disconsolately at each other or the opposite banks. This interruption of all communication, as might be anticipated, is a great inconvenience, and sometimes leads to serious consequences, of which there had been only recently an example. When the Gotiro (the regent of the kingdom) was slain in the streets of Yeddo, a few months ago, by a band of the Prince of Meto's men, who carved their way, sword in hand, through his retinue, and hacked his head off as he sat helpless in his norimon—it is said some of his own vassals in the country had got wind of the plot against his life and followed sharp on the heels of the conspirators; there was a day's interval between them, however, and in that day the river became impassable, to their despair. Life and death were hanging on their speed, but their road was stopped by this impassable ford, and when they reached Yeddo the catastrophe which their warning might have averted was consummated, and their prince had been slain.

We were more fortunate, and our stout porters carried us safely across without demur, though the water was surging around their hips in many places, but they seemed to know perfectly where to pick their steps, and, taking us in a zigzag line up the stream, made their way without much difficulty. Our whole party was carried over for 11 *itchiboos*, about 15*s.*, a large sum in Japan, to be divided amongst some thirty men for a half-hour's work; but it is by no means certain this sum was paid to them. That was the amount charged to us: whether it reached their hands undiminished could not be ascertained, as the payment was necessarily made through the attendant officers, and there was at least a great probability of diminution on the way.

The entrance of such a cavalcade of foreigners was doubtless a great event in all the towns we passed through: in fact, the like could never have been seen before; and as each roadside village—and even the larger towns—generally consists of one long and seemingly endless street, the news of our approach spread as rapidly and unerringly as the message of an electric telegraph,

turning out the whole population as if by a simultaneous shock—men, women, and children, clothed and nude, dogs, poultry, and cats. I think at Odawara no living thing could have been left inside. Such a waving sea of heads seemed to bar our passage that I began to congratulate myself (as we had outstripped all our own people) that my unknown benefactor the daimiō had so courteously supplied me with an escort. I felt some curiosity as to the mode they would take to open a way through the dense mass of living bodies and excited heads, which looked all the more formidable the nearer we approached. My guides, however, seemed perfectly unembarrassed, and well they might be: for when within a few steps of the foremost ranks there was a wave of the fan and a single word of command, *Sh'—tānriō* (kneel down), when, as if by magic, a wide path was opened and every head dropped, the body disappearing, in some marvellous way, behind the legs and knees of its owner.

During both these days, which brought us to the foot of the Hakoni range of mountains, rising some 7000 feet above the sea, nothing could exceed the beauty of the road, generally consisting of a fine avenue of smooth gravel, through a succession of fertile plains and valleys, where millet, buck-wheat, and rice were all giving promise of rich harvest. The oligarchic despotism, strongly intertwined with roots of feudalism, perpetually recalls the once powerful Government of Venice, with its strong-handed nobles, its secret Council of ten dark, dread inquisitors, and its Doge at the head, bearer of a phantom sceptre—only here there are two such doges instead of one, for the Mikado (fancifully described by Europeans as the spiritual Emperor, simply because he is not allowed to meddle with any temporal affairs) is something less than a doge, who had a part to play in State pageants—while the Tycoon or Saigoun, as he has generally been called, originally the Mikado's generalissimo, then his supplanter, as hereditary chief of the executive, is now by a sort of retributive justice reduced to precisely the same helpless condition as his suzerain: both are shut up within their castle moats—too sacred to be allowed to mingle in the common affairs of State—puppets in the hands of the more puissant feudatories, who daily go through the form of receiving orders, which they alone dictate. Nevertheless, if apart from all theories of government we look at the results—forget that there is no universal suffrage, no liberty of the press or of speech, but a system of universal espionage instead, with Draconic laws, often ruthlessly executed, and wander among the smiling valleys, rich with varied produce, watch the careless freedom of the labourers as they return to their villages and homesteads, as happy looking as any in Great Britain—we hesitate to characterize the Government as bad. Greater evidences may be seen in the British Isles any day of the

year, of misery, destitution, and discontent, than I have yet been able to discover in Japan during a long residence. If any signs of mutation or trouble appear in her political horizon, the ruling classes point with a significant gesture to the date of foreign treaties as the beginning of troubles. Isolation from the rest of the world left them nothing to desire; free intercourse and trade threatens them with a participation in all the miseries, mutations, and political struggles from which they have continued so long exempt. This is undoubtedly the prevailing feeling and opinion of the present Government and the body of daimios generally—all, in a word, who have any voice or action in Japan; *they see nothing but evil in the conjuncture which has brought Western Powers to their shores, and opened Japanese ports to foreign trade.*

From Odawara to Missima the road lies through the mountain passes of Hakoni, which are situated very near the summit of the range, a distance of nearly 7 leagues of as rough mountain-roads as can well be conceived. Many are but watercourses filled with fragments of rocks for paving-stones, over which it was quite impossible to ride; even with the advantage of the straw shoes of the country, which with our ironshod horses were found indispensable, it was difficult work for the "bettos" (grooms) to lead them safely across the boulders, without the encumbrance of a rider, and several of them had falls. It is almost one continual ascent, too, which renders it slow as well as laborious work to make much progress. But the scenery would amply repay any fatigue of body. There was much to remind a Swiss traveller of the Oberland in parts, especially the descent by Lauterbrunnen. High wooded hills, where the pine predominated, were here; fresh green valleys, and a mountain-stream winding through the fields at the bottom: but it is less grand in its principal features. Here are no bare rocks and high-peaked mountains, with their eternal glaciers and mantle of snow; fewer cascades are to be seen leaping over the precipitous rocks in a sheer descent of a thousand feet. The Scheideck and Wetterhorn, with its bare walls towering to the sky, are wanting, nor is there any rival in all the mountain-range of Hakoni to the Jungfrau, with its soaring pinnacle and vast expanse of snow and glacier. The giants of the Bernese chain, it must be confessed, fling into the shade anything to be seen in Japan. But if its scenery may not compete with the Alps in sublimity, there is in lieu far greater variety and richness of vegetation. Here the Scotch fir and the pine mingle high up the mountain sides with the bamboo's light and graceful foliage and the Cryptomeria, which for the first time I saw in its glory as timber. In our descent to the lake of Hakoni, on the summit of the pass, we came upon a fine avenue of these, several measuring in girth, 3 feet from the ground, from 14 to 16 feet, and standing upwards of 150 feet

high. The wild hydrangia, with its large flower-clusters, black, blue, and white, covered the banks, side by side with the unpretending Scotch thistle. From the valleys to the highest summits every hill and mountain presented one dense mass of luxuriant trees and shrubs. The oak, the maple, the beech, the lime, the alder, and the chestnut, all were here, and in rich autumnal tints. The botanist returned laden with many new ferns and other specimens of interest. The *Thuyopsis dolabrata*, described by Thunberg, and of which the only specimen in England was, I believe, until lately in the gardens of Mr. Veitch, I looked for with great interest, but must confess I was disappointed in the effect of the tree. Thunberg was so enthusiastic in his admiration, that perhaps disappointment was inevitable. It is a fine pine, and with its silver lining, unlike in this and other respects any in Europe, but still scarcely calculated to throw any but a botanist escaping from a sea-girt prison and the first discoverer into extacies. I have recently sent several specimens in Ward's cases to the Royal Gardens at Kew and Windsor, and one a variegated species, not before described, I believe. It was found in the monastery of *Omia*, at the foot of Fusi-yama, and immediately secured, "for a consideration," from its proprietor, the superior. On my return to Yeddo, however, I found many others of the same kind; and it has been observed that there is a great disposition in all the vegetation of Japan for plants to become variegated. That I may not fatigue the Society, however, with a long enumeration of plants and mere botanical names, I send, by way of appendix, some detailed notes and a list of all the species observed throughout the expedition, which Mr. Veitch made out from day to day, and was good enough to copy for my use.

After a three hours' toilsome ascent we reached Yomotz, a little hamlet buried in the mountains, and clustered round some hot saline springs. The common calamity of the country had befallen the villagers, in a fire, from the ashes of which they had only partially been able to build up their houses anew, though, as the only materials are wood and mud, the process is neither slow nor costly. We made a very short stay as the clouds threatened rain, and we had still four hours' journey before us even to reach the lake and village of Hakoni, little more than half-way to Missima, in the plain beyond the pass, whither we were bound for the night. A young member of the party, however, had profited by the interval to plunge into one of the saline baths, and came out even more quickly than he entered, satisfied that a Japanese skin must be much more tolerant of heat than the Caucasian's, for he emerged in appearance like a lobster, and feeling much as that martyr to gastronomy may be supposed to experience before all feeling is boiled out of him.

There seemed to be several sources with a saline taste, and the

Japanese, who are a race of bathers, we were informed came from great distances to these baths. They rival, indeed, the ancient Romans in their love for every form of mineral bath, and for the use of alternating hot and cold water and steam: it is the one great luxury to which they devote daily one, two, or more hours of their time, the two sexes mingling promiscuously without any kind of clothing, and also it must be said without any appearance of embarrassment or sense of immodesty. They are the common resorts of all the lower classes and the retainers of the daimios. The bath-house is, in truth, an important institution in Japan: it is, what the baths were to the ancients and the café is to a Frenchman, the grand lounge. Towards the close of the day and far into the night, in passing along the streets of Yeddó, or any other large town on a summer evening, at every thirty steps you come to a bath-house. You know of their vicinity by the lights streaming through open doors and windows, and the hum of many voices, base and tenor, in full chorus of conversation. On coming opposite, you see two or three hundred nude figures of both sexes moving about, divided only nominally by a line of pillars, although each keeps to his or her side, while a lively interchange of salutations and conversation is going on between the opposite sides and sexes: and here all the gossip of the neighbourhood and town is no doubt ventilated. No one is so poor that he cannot secure a bath—no one so wretched that this luxury, at least, may not be his,—and here, if they have any cares, they seem to forget them all in the streaming atmosphere of the very oddest assemblage that can well be conceived. In the primitive state of our first parents as regards covering, and, like them, perfectly free from either reproach or shame, they seem indeed perfectly unconscious, under the sanctions of national custom, of anything worthy of attention or remark, much less of censure or condemnation.

The rain began to descend as we left the baths of Yomotz, and before we reached the guarded barrier at the entrance of the Pass we were all thoroughly drenched and tired. As there was a good honjen just outside the barrier, and picturesquely situated at the edge of the lake, all thought of proceeding further until the next day was given up, and Lieut. Robinson set to work, to the infinite astonishment of some native attendants, to boil his thermometer—in other words, to ascertain the height of the lake above the sea, which he duly reported to be 6250 feet. The water boiled at a temperature of 198°, and the aneroid fell to 27.90. The lake itself is a fine sheet of water, surrounded by hills, and tradition says that it fills the extinct crater of a volcano. I was very sorry that no boat could be found to enable us to try and get soundings. A boat there was, but in a decayed and leaky condition, which would have required moreover a large crew. Not a man, however, was

forthcoming. We were assured there were no fishermen on the spot, and we could only conclude that it was a precaution to prevent the possibility of any one crossing, to avoid the pass and its guard at each end. The hills which come steep down to the water's edge are covered with a coarse grass at the top, and the highest in the immediate vicinity I should not estimate at more than 300 or 500 feet, so near the summit of the range is the level of the lake at this part.

The following morning the rain had passed away, and we took the road to Missima in the plain, passing through the second barrier, where, as at the first, warned of our approach, no doubt, and the exemption from all search or detention, claimed as due to Her Majesty's envoy, the whole party were allowed to pass without question. Somewhat to our surprise we found an ascent of more than an hour before we reached the highest point beyond the pass. From thence a beautiful view was gained of the plain below, stretching away to the sea, dotted over with towns and hamlets, chiefly on the border of a winding stream fringed with evergreens. The view down the mountain side to the valley and sea beyond, basking in sunshine, was most picturesque in effect. Not only the fields were covered with crops waving to the harvest, but many of the hills to the right and left were also cultivated in terraces nearly to the summit; and where neither rice nor maize could be grown, timber, with luxuriant foliage of great variety, succeeded. We halted just before we made our last stage of descent at one of the wayside booths, which are to be met with everywhere along the main road in Japan at short distances, judging from that part of it along which we travelled. In these the poorest traveller, if he have but a few cash (integral parts of a farthing) may get a meal served with courtesy, which will keep him from exhaustion for many hours—a sweet potato steaming hot, a fried fish, and a cup of tea: or, if he seeks lighter diet, any fruit that is in season—a bunch of grapes or a slice of water-melon, red and luscious as it lies invitingly under the shade. If utterly destitute, without one cash, he may still have rest, a seat and a glass of pure fresh water, though it has often to be brought from a great distance. Surely this says much for the people, where such provision for the least wealthy and most needy classes is made, and, with a scanty profit, is so kindly extended to all. We halted here, partly tempted by a large melon, which turned its deep-red honeycomb towards us, and partly to ascend a natural platform by the side of the road, round which some seats were placed that the traveller might drink in refreshment by the eye as well as the palate. It overlooked the whole glorious plain, with the spurs of woody hills projecting in wavy lines, as though still washed by the sea, where very evidently it had once been fretting at their base, though now far removed, and in its place

fertile fields of emerald green were spread like a carpet. Here we ate, I should be afraid to say how many, beautiful slices of the great melon, rendered more delicious by two hours of hard walking, with a hot sun overhead—for the road so far had offered little inducement to ride, it was so rough and steep, whether in ascent or descent. The silver itzeboo (value about 1s. 6d.) which I gave in payment for what would not have been charged more than a tempo, or one-sixteenth of that moderate sum, was given in the mental hope that it might make some amends for many smaller profits. The exceeding cheapness of things whenever we happen, as in that case, to be out of reach of Government officers and escort, and to get at the real price, does not tend to improve the temper when, on descending to the plain from whence they are brought at great labour, we are told first that there are none, and then that a single melon will cost the price of sixteen on the hill! Yet this befell us at Missima, where we rested for the night. The people have many virtues; but a long experience has only brought to light in all the official class many vices, and that of plundering the foreigner unhappily consigned to their charge is among the first, and I fear the most incorrigible. As for mendacity, one does not expect impossibilities or miracles of virtue, especially in the East, and truth is one of the things only to be got at their hands by something near akin to a miracle. It is their business to conceal the truth from foreigners in all cases; thus they are given to romancing (not to use hard words) by vocation, a sense of duty, and I am afraid it must also be said, by taste and inveterate habit.

Missima is a large and populous town, and the same dense crowds greeted our entrance as at Odiawara and every other considerable place. But the magic word in the mouth of the Daimio's officer never failed in its effect; nor did the escort ever fail us either, for a party had attended us on foot the whole way over the mountains, and only left us the next day, after seeing us safely out of the town. As we approached our next resting-place, Yosiwara, another of the "Seigneurs," in whose territory it lay, appeared to have been carefully apprised of our approach, and we found an escort a mile or two in advance, waiting to conduct us to our quarters. And the same attention was renewed everywhere throughout the journey. From Missima we had passed through the towns of Nûmadsu and Harra, each about a league apart, and plainly to be seen from the heights of Hâkoni. From thence to Yosiwara, still on the plain, is about three leagues, and here we were to take our leave of the Tocaïdo, or great high road. The route to Fusi-yama here turns off, and leads by cross roads to Omio and Mûsiyânâ, two hamlets which are situated at the foot of the mountain, and where some important temples and monasteries are grouped. In the evening a deputation was announced from the

superior of the fraternity at Omio, sent to salute me, and convey a request that the temple might be my resting-place for the following night; with many flattering expressions, significant of the desire of their chief to have so distinguished an honour as to entertain the Minister of Great Britain; no one of such rank, foreigner or Japanese, having ever travelled to that region, with much more to the same effect. Considering that they had come a long day's journey on foot, through mud and rain, to offer me such hospitality, the least I could do was to assure them I would not fail, either in going or returning, to show that the attention was appreciated, and to take up my quarters with them. The three shaven bonzes, with sandalled feet, but swords in their belts, were then induced to raise their heads and bodies to something like an upright posture, and take their leave.

It had rained heavily nearly all day, and most of the party enveloped in extemporized *pouches* and leggings, manufactured out of the oil-paper cloaks of the country (on one of which the tracing of the route will be found), and some with the still more common straw coats of the peasants, it is to be feared, presented rather an incongruous appearance, as they traversed both Námadsu and Harra, preceded by an escort of daimio's officers, and paced slowly through their interminably long streets. The road would otherwise have been very enjoyable; one continued avenue, bordered with cryptomeriæ—the cedar of Japan, as it has been not inaptly called, though not a cedar in reality. A loud roar of breakers reached the ear, softened by its passage through a narrow belt of pines which drew a scanty nourishment from the sand-dunes that separated us from the edge of the bay. Being as wet as it was well possible to be, instead of halting as intended for a mid-day meal and rest at Harra, we pushed on, to the great confusion and disgust of cooks, yaconins, and all the host of followers who never counted upon the possibility of a change in the order of march, and had already got in and begun to make themselves comfortable. I have no doubt comparisons, no way to our advantage, were drawn between us, with our independent and erratic proceedings, and a Japanese magnate, whose progress never exceeds three miles an hour, and who is therefore quite above sudden changes and a three-leagues ride through the pelting rain. We had not long been safely housed in Yosiwara, when signs of a coming tempest were evident; and about 10 o'clock at night a furious gale set in with torrents of rain, and soon showed by its veering round the compass, that a typhoon was sweeping its fatal circles along the coast. We all thought of the *Camilla* and her gallant crew, one of her Majesty's ships, which, according to all calculations, ought even then to be near Atami, at the entrance of the bay of Yeddo, where her commander, Captain Colville, was to call

on his way from Hakodadi. A sad foreboding came upon more than one, only too truly realized in the sequel. The *Camilla* left Hakodadi on the 2nd September, with one of the Government interpreters and a British merchant as passengers on board, and neither ship, commander, nor passengers, have ever been heard of since. Either in the storm of the 2nd, or this, she must have gone down with her freight of 130 men in the pride of their strength.

The next morning was still sufficiently boisterous to deter us from an early start. The aneroid had fallen to 29.50; but about 2 o'clock in the afternoon, the baggage having been despatched on before, we started for Omio, the nearest of the temple monasteries, paid a short visit of ceremony and thanks, and pressed on to Músiyãmã, the last civilized place on our way. Great preparation had been made for the party; extra bath and stable accommodation run up; the inner sanctum of the temple itself, with its altar divided into two, and screened off, to give the minister a separate room; and the chief priest himself was so profoundly impressed with the dignity of his guests, that we began to wonder whether he would ever be induced to stand up on his feet again. A hot tub, and a cold douche after it, soon refreshed us all. I say a tub, for such it is; and I begin to admire the economy of space and other advantages it possesses over the long slipper-bath. About 4 feet deep, of slightly oval shape, and just long enough to let an adult sit down with his knees very close to his chest, as is the Japanese habitual mode, less water is required to cover the whole body, and less space for the bath. To many, at the end, a copper tub is attached, with a grating at the bottom, into which a handful of charcoal is thrown, and in an hour a hot bath is ready. Some such appliance as this would be a great comfort, and in sickness a blessing in many an English house, where the getting a hot bath in a sick-room is a work for the whole household. Attached will be found a section of one of these baths, to show how simple and easy the system is. In Italy a double copper cylinder, removable at pleasure, is used instead; and by either process great facilities may be gained in the most economical way. The Japanese indeed have a perfect genius for attaining the most useful ends, with the least expenditure of material, and by the simplest means. No small merit. For instance, at the various honjins where we stopped for the night, we should have been devoured by the mosquitoes, had the landlords not come to our rescue by the simplest of all contrivances. A mosquito-curtain, open at the bottom, made up in the shape of a parallelogram, is let down over the mat, 6 feet by 3, selected by the sleeper; a cord is run from each of the four upper corners (into which a sort of eyelet-hole has been worked), and four nails driven in at opposite sides of the room, enable a servant to suspend it.

Beneath this the persecuted martyr creeps, tucking the sides and ends under his cotton quilt or mattress, and he may then sleep undisturbed by anything that *flies*. So our hospitable superior had evidently tried his ingenuity to invent impromptu seats for Westerns, who cannot sit upon their heels like other men, or squat on their mats with their legs tucked under them either; and it was amusing to see by what simple means he had succeeded. Half-a-dozen small tubs, a plank nailed over each, and over that a cotton quilt doubled into a cushion—materials at hand and in daily use—and we were all seated like Christians, with a minimum of cost to our host. Unluckily the table only reached our knees when thus elevated; but no man can be equal to so many new exigences in travellers! So we lowered our bodies to the mats and used the stools for our elbows, realizing the Roman habit of eating reclining, and managed to eat and drink too without difficulty or grumbling.

The next morning anxious inquiries were made very early as to the weather, and the announcement that it was fine, and the ascent practicable, roused the whole party soon after daybreak. The horses were promptly saddled for the last stage up the lower slopes. Three martial-looking priests, Yoboos, were told off for our guides, and a few Yoliki—"strong men of the mountain"—took our railroad-wrappers and a few stores, in the shape of coffee, rice, and biscuit, wherewith to sustain us during the two days and nights to be occupied with ascent and return. At first our way lay through waving fields of corn, succeeded by a belt of high rank grass; but soon we entered the margin of the wood that clings round the base and creeps high up the side of the mountain, clothing the shoulders of the towering peak, like the shaggy mane of a lion, with majesty. At first we found trees of large growth, goodly timber, of the oak, the pine, and the beech, and soon came upon traces of the fury with which the typhoon had swept across. Many large trees had been broken short off, and others uprooted; one of these had been thrown right across our path, and compelled us either to scramble over or creep under its massive trunk. At Hachi-mondo we left the horses and the last trace of permanent habitations and the haunts of men. Soon after the wood became thinner and more stunted in growth, while the bark and birch took the place of the oak and pine. Just before we entered the forest-ground a lark rose on the wing—the first I have ever seen or heard in Japan—and filled the air with its glad song. As a general rule, it may be said of this country, so rarely gifted by Nature in nearly all else, that the birds have no song, the flowers no fragrance, the fruit and vegetables no savour or delicacy. It has been suggested, in respect to the fruit and vegetables, that this is the fault of the cultivator, who never seeks to improve or

change the original seed or stock. This may be so: but how account for the scentless flower and songless birds? Is it a part of the great system of compensation which everywhere pervades the universe? Certain it is, there exists a mutual adaptation of things here as elsewhere; for, going along the road, I found a peasant and his children devouring, with great gusto, a handful of plums, as hard as stones, and as green and sour as imagination can conceive. "You will make yourself ill, Nani!" observed my friend, with an incredulous air. "Oh, no! we eat a basketful every day, and find them excellent." It may safely be said they would puzzle the digestive powers of any other race, and one only concludes that the Japanese gastric juice must be specially adapted to such food. Before we left the wood-belt we had many stories of the wild animals to which it gave shelter—deer, wild boar, and horses by thousands! Some doubt was expressed as to the number of the latter, and an appeal made to the Japanese officer attached as interpreter. "Oh, certainly! quite true; only there are millions!" and nothing could shake his testimony. But this is not the first time we have observed the absence of all definite notions of number beyond a few hundreds. I am satisfied, when the Ministers were told we had exacted 8,000,000 taels of silver from the Chinese, that they merely knew we intended to convey the idea of having demanded a very heavy sum. Whatever may be the *fera natura* in this region, there is, no doubt, a large area of jungle and forest to give cover. At Atami, later, we saw frequent traces of the boar. Deer must be plentiful also not far from Yeddo, since even to a foreigner the price of a large stag does not exceed 25s. We soon lost all trace of life, vegetable or animal; a solitary sparrow or two—the most universal of all birds, it would seem—alone flitted occasionally across our path, and tame, as are most birds in Japan,—a clear proof that they are little molested by man. Wild duck and teal float on the castle-moats at Yeddo and on the temple lakes in the vicinity of the city, which pay as little attention to the approach of any one as the most domestic barn-yard breed. So of wild geese and storks: for if some European dog, otherwise brought up, gets them on the wing by running in upon them, they merely fly across his master's vision, within half-gunshot, and settle down again a few yards off: a very hard case, it must be admitted, for a keen sportsman, who, under Japanese laws (or love of petty restrictions), is not allowed to pull a trigger; all efforts hitherto made to obtain the licence of the Government having entirely failed. In the winding ascent over the rubble and scorie of the mountain, which alone is seen after ascending about half-way, little huts or caves, as these resting-places are called, partly dug out of the side and roofed over to give refuge to the pilgrims, appeared. There are, I think, eleven

from Hachi-mondo to the summit, and they are generally from one to two miles asunder. In one of these we took up our quarters for the night and laid down our rugs; too-tired to be very delicate; nevertheless, the cold and the occupants we found former pilgrims had left precluded much sleep. Daybreak was rather a relief, and, after a cup of hot coffee and a biscuit, we commenced the upper half of the ascent. The first part, after we had left the horses, had occupied about four hours in steady work, and we reached our sleeping-station a little before sunset. Lava and scoræ everywhere around; the clouds sailing far below at our feet, and a vast panorama of hill and plain, bounded by the sea, stretched far away. We looked down upon the summits of the Hakoni range, being evidently far above their level, and could distinctly see the lake lying in one of the hollows. The last half of the ascent is by far the most arduous, growing more steep as each station is passed. The first rays of the sun just touched with a line of light the quiet waters of the Pacific, as they wash the coast, when we made our start. The first station seemed very near, and was reached within the hour. But each step now became more difficult; the path—if such the zigzag way be called which our guides took—often led directly over fragments of out-jutting rock, while the loose scoræ prevented firm footing and added much to the fatigue. The air became more rarefied, and perceptibly affected the breathing. At last the third station was passed, and a strong effort carried us on to the fourth; the whole party by this time straggling at long intervals between the two. This was now the last between us and the summit. It did not seem so far; but a few figures on the edge of the crater unfortunately furnished a means of measurement, and they looked painfully diminutive. This last stage, more rough and precipitous than all preceding, had this further disadvantage—that it came after the fatigue of all the others. More than an hour's toil and frequent stoppage for breath, and rest to aching legs and spine were needed, and more than one felt very near the end of his strength before the last step placed the happy pilgrim on the top-most stone, and enabled him to look down the yawning crater. This is a great oval opening, with jagged lips, estimated by Lieutenant Robinson, with such means of measurement as he had, at about 1100 yards in length, with a mean width of 600, and probably about 350 in depth. Looking down on the other side, which had a northern aspect, there seemed a total absence of vegetation even on the lower levels. The rich country we had left was completely hid by a canopy of clouds drifting far below. Water boiled at 184° of Fahrenheit. The estimated height of the edge of the crater above the level of the sea was 13,977 feet, and the highest peak 14,177.

At our resting-place on the top of Fusi-yama the latitude was calculated $35^{\circ} 21'$ N.; longitude $138^{\circ} 42'$ E.; variation of compass at ditto $2^{\circ} 02'$ W.; temperature of air in sun at noon 54° Fahrenheit.

The Japanese, who perform this pilgrimage, are generally dressed in white vestments, which, on the summit, are stamped with various seals and images by the priests located there during the season.

No information I was able to obtain of these various objects of reverence or worship was of sufficient interest to detain the Society. But they have been sent with a few words of explanation written upon them. As far as I could learn, a very holy man, the founder of the Sintoo religion, took up his residence on this mountain, and his spirit is still held to have influence to bestow health and various other blessings on those who make the pilgrimage. The volcano has long been extinct; the latest eruption recorded was in 1707, and the tradition is, that the mountain itself rose in a single night from the bowels of the earth—a lake of equal dimensions appearing in the same hour at Miaco. Specimens of the lava, scorix, &c., picked up on the summit, have been sent.

The time actually spent in toiling up the ascent was eight hours, and the descent was accomplished in little more than three. We slept two nights on the mountain, and had greatly to congratulate ourselves on the weather, having fallen upon the only two fine days out of six or seven bad, and encountered the typhoon while safe at the foot. As we descended on the last morning there was a thick Scotch mist which soon changed into a drenching rain. We only found patches of snow here and there, near the summit; but on our return to Yeddo, three weeks later, we saw it completely covered. We had thus succeeded in visiting the matchless mountain in the only interval of fine weather, before the setting in of winter would have made it impossible. The prediction of the Ministers, that we were too late, was thus very near indeed being verified. True, like many other prophets of evil, they did much to make it come to pass.

From Kanagawa I heard that when they were visited by the typhoon there, the report was circulated that it was a sign of the anger of the gods at the foreigner profaning the sacred precincts of their stormy home. We now made our way back to Missima, and from thence by a mountain-road across the spur of the Hakoni range towards the seacoast. We reached the secluded village and bay of Atami in the afternoon of the second day. The bay is deeply indented between two great promontories, and the gorge is continued back some two miles, rising in broken terraces to the highest ridges. Here the little village of some two or three hundred

houses lies buried in what seems a great caldron: one principal source or vent-hole is in the centre, and generally six times in the twenty-four hours an immense volume of steam and slightly sulphurous water is ejected; the former varies in temperature from 100° to 120° Fahrenheit, and the water about the same. The impetus or force with which the explosive action takes place, varies in different days, and the hours are not very regular. I have attached at the end the record I kept. There are many other vents in the village of less extent, and scattered over an area of several miles. The Japanese are not wholly ignorant of the sanatory properties of these mineral sources, but, until my visit, they had never used the steam for vapour-baths. I had a small building run up for that purpose near to the principal source, and left it for the benefit of my successors. In various parts of the village troughs were made, into which the villagers, men and women, might often be seen plunged up to their necks, and whiling away the time with conversation, while outside the doors of many of the houses smaller vents were used to heat the pot, and boil or steam their sweet potatoes. Two or three miles along the seacoast the waters make their way over a portion of the cliffs, forming a natural douche, under which I found an old woman seeking health, if not renovated youth, and a little higher up a sore-backed horse was being submitted to the same process. These waters are nearly tasteless, and not unlike those of Wildbad in the Black Forest.

I had no means of chemical analysis with me, but I should say the proportion of sulphur was very small, though distinctly perceptible in the steam or vapour. They are slightly aperient in effect. Here I remained, excellently put up at the principal honjin, kept for the daimios and their families, with a beautiful view from my balcony over the bay. The gorge, widening as it stretches backward into a valley about a mile in width, is under perfect cultivation, terraced with marvellous patience and skill, and growing rice chiefly, which they appear to cultivate of three different kinds: one, at least, a dry kind suited to elevated lands. It afforded a good opportunity of observing the village life of Japan, with a population composed of small cotters, farmers, and fishermen. The bay abounds in fish, some very curious. Mr. Gower, of Her Majesty's Legation, brought home one day a flat fish about the size of the palm, with long thread-like prolongations from the tail and fins, several inches in length, and another, hard as bone all over, with a thick gibbous head, which they call the horse-fish, also small, not more than three inches in length; for eating, mackerel and a sort of pomfret were abundant. Only rice and vegetables are grown in the valley. Nitre is found somewhere in the neighbourhood in considerable quantity, and forms an article of export, while a little manufactory of boxes, a sort of Tunbridge-

ware, is carried on in nearly every cottage, chiefly made out of the roots of the camphor and maple. They are wonderfully perfect in workmanship, though made with the roughest tools. Their lathe is of the most primitive kind; the wheel being turned by a boy, while the workman holds and fashions the wood into trays, circular boxes of great variety, saucers, egg-like nests of balls, cups, &c., all marvels of cheapness as well as ingenuity. The same things are sold at Yokohama, but at a profit of 100 per cent. at least. I should not omit to mention the existence of a paper manufactory here, and, as it was the property of the proprietor of the house, I had every facility for watching the whole process. The manufacture here, at least, consists entirely of the produce of bark of trees, with colouring matter introduced in the process. I could not ascertain the botanical character of the trees, for only the bark already peeled off is brought from the surrounding hills. But more than one plant of the growth of shrubs is employed; some for the fibrous quality, others for glutinous properties. The process is very simple, and requires no elaborate machinery. The bark is first steeped in water until thoroughly softened, it is then beaten with wooden mallets until reduced to a state of mash, it is then again macerated in water, and when finally brought into a pulpy and homogeneous state, any colouring matter desired is introduced, and the pulp thus prepared, and in a very liquid state, is poured over wire frames much as in England and dried. Some specimens of the paper I saw manufactured I will endeavour to send, if not by this mail by the next. Specimens of the bark were sent with the box despatched round the Cape. Strange to say, bamboo—the universal material of paper in China, although abundant here—is never employed. Rags but rarely. Profiting by this circumstance, the English merchants have been shipping large quantities for England. And at first they were “rag-cheap” and dirty withal, but no sooner did the Japanese understand that something like a steady demand might be found, than the price was immediately raised. Still, with the vast abundance of cotton rags, for which there seems to be little or no native demand, I should think Japan might become a permanent and valuable source of supply, at remunerative rates to the exporter. No country in the world surpasses Japan in the excellence of the manufacture, for all the purposes they require paper to be applied to, and no people have applied it to so many. In addition to the usual purposes of writing and packing, they make handkerchiefs of it, a vast class of *papier maché* articles, boxes, reticules, hats, tiles, and an equally numerous list of articles in imitation leather, of which last I send one or two specimens. A specimen of fossilized or petrified vegetable matter found here has been sent with the box. It is altogether as quiet, picturesque, and secluded a spot as could well be selected

for rest and recreation ; but there is one sad want, and that is, of roads or beach on which the visitor can either walk or ride. The beach is composed of large pebbles and shingle, upon which the waves of the Pacific break and roll with a reverberating sound heard through the whole valley. The roads, one across the range, and the other along the seacoast, both leading to Missima, and a third to Simoda, are all as bad, rough, and precipitous, as can well be conceived. But nothing can well exceed the beauty of the scenery by both routes to Missima. The road across the mountain-range from Missima, which we took on our way to Atami, was over a line of country full of grand and picturesque features ; wild downs, bare basaltic rocks often protruding from the sides of steep ravines, terraced hills and lovely valleys sloping down to the sea, with the usual luxuriance of foliage, marked the whole way. I have seen few countries in Europe or Asia possessing so many elements of richness and picturesque beauty combined as these islands may boast. Of the geological features I can give little information. The soil under cultivation in all the valleys seems to be similar with that observable in tracts of Central India, called "black" or "cotton soil," a rich earth, the detritus of igneous rocks, further fertilized here, during a long succession of ages, by the application of the liquid manure from towns. Riding along the road the mould may be seen several feet in depth, richer looking than any garden mould, and without a stone. Indeed in all the adjacent country of the capital, more varied in form and character, and more beautiful in picturesque features than any capital I have seen can boast of, it is a saying that "stones and gold are equally scarce;" yet, with all this apparent richness and careful culture, there is a sad deficiency of flavour and delicacy in everything it produces except rice, which I think the best in the world. Apples, plums, and peaches, are all plentiful, but indifferent, and never allowed to ripen on the trees ; but these may be seen trellised horizontally, and spreading over acres of ground. Their grapes and water-melons come to the greatest perfection. Pears, gooseberries, currants, pine-apples, and bananas, are all unknown, though they have the plant of the latter, and the persimmon produces well. The only rocks I have met with have either been of igneous character, basaltic, or granite, and a soft sandstone. A hard kind of slate also is to be seen occasionally. But the mountain regions are, no doubt, rich in mineral wealth ; gold, silver, iron, copper, lead and coal, all seem abundant, and are all nearly equally jealously guarded by Government, which holds that, as minerals cannot be reproduced, no generation has right to more than is required for its daily wants. If this be true, there is at least something disinterested and noble in the motive which refuses wealth at the cost of posterity.

When the ports were opened we found the relative value of gold and silver was as 1 to 3 only, instead of 1 to 15 or 16. Hence an unfortunate commencement to foreign relations, since a rush was made upon the gold coinage in exchange for silver by the first foreign settlers, which brought back to the Japanese the old days of Spanish and Portuguese spoliation, when they saw their gold shipped away by tons. It took six months of bitter experience to induce them to apply the only remedy, which was to establish the same relative rates of value as prevail over the rest of the world, but the mischief was done in the minds of the Japanese rulers.

They have evidently much to learn in mining. I visited the lead-mines at Hakodadi, which seemed rich in ore, but worked in the most primitive manner. The Governor asked with some interest if, from my knowledge of European mining, I thought improvements might be introduced; and I told him that, although my knowledge of the subject was very small, I had no doubt, and with a great increase of produce and ultimate reduction of expenditure; adding that now, with treaties of friendly character, there could be no difficulty in obtaining the services of competent Europeans. It has never led to anything, however. They are both jealous of introducing foreigners into their mines, and little disposed to pay the price of good service. I asked why no lead could be found for export, and he replied, it was all required by the Government; on expressing some surprise as to what the Government could want with lead, he observed, it was all required to make bullets for practice! I smiled at the naïveté of the reply, and remarked they must be very anxious to have proficient marksmen. But the same reluctance is observable in regard to all mineral produce, and can only be explained by the political economy already referred to; that it is a deposit in their hands not to be expended. It is probable they have good coal, but all that we have been able to get hitherto is very inferior, though bituminous. As applied to steam-power it is not equal to more than one-third its bulk of the best Welsh coal; and, moreover, it clinkers and fouls the furnaces to a most inconvenient extent. I have annexed a short report received from Lieutenant Robinson, upon the coal supplied his ship.

The climate in the centre island of Nipon is one of the finest in the world, but the winter at Hakodadi is long and severe. At Yeddo little snow lies on the ground, and from October to February of 1860 we had a succession of beautiful weather, although this last winter has been less favourable. The summer is short, and by no means oppressive. But it is a perilous coast to navigate, and frightful storms rage through the winter, with occasional typhoons in the autumn. Many ships have been lost since the ports were opened, and there is great necessity for a good survey of the whole eastern coast. I will attach to this paper an imperfect

meteorological register, kept at Yeddo during the past year; by which it will be seen the maximum heat was 91° , the minimum temperature 28° . The range of the heat of the summer months is from 70° to 90° , and 80° may be taken as an average; and of cold in the winter, the range is from 28° to 60° , with an average of 50° . Between February, 1860, and February, 1861, there were 33 shocks of earthquakes at Yeddo. The climate, the soil, and the people are superior to any that I know in the East, and, but for certain drawbacks, it might be a most enviable place of residence even for Europeans. Its isolation from the rest of the world, which still continues to a great extent, we may hope will then gradually disappear; but its stormy coasts are little likely to diminish their terrors, any more than its volcanoes promise rest to the crust of earth above, to which they impart periodical ague-fits with far too great frequency and intensity to make a residence either pleasant or safe. Lastly, the rulers of the land are in sad contrast to the people they govern. The latter are good-natured, patient, industrious, and willing to enter into the closest relations of amity and commerce; while the governing classes look upon the introduction of the foreigner as a national calamity, boding nothing but ruin to themselves if not resisted in time. Hence many troubles, difficulties, and dangers; for if life might be made nowhere in the East more pleasant than in Japan, it must in honesty be confessed there is no country where it is less secure, or made more intolerable by those who have both the will and the power to render it so. How long it may be before this great obstacle can be overcome it would be hazardous to predict, and equally profitless, perhaps, would it be to speculate on the many dangers which lie in our path. We can only hope that patience and forbearance, tempered with firmness, may meet its fair reward in the end; and that Japan, as it was the last link wanting in the chain of civilization and Christianity round the earth from west to east, so it may be permitted to be the first and one exception in the world's experience, and be brought into close relationship with all the comity of Western nations, without either war or subjugation. That is the task on which we are now engaged; and if the opening of Japan—for which we have to thank our enterprising cousins in America—be something too much like the opening of Pandora's box—one which brought many evils on the world—we must take for our comfort the reflection that here too, perhaps, Hope may be found at the bottom. At present the first series of evils—murky and ominous-looking—are only working off. After these the atmosphere may become clearer; and, since the fatal lid *has* been opened, there seems to be nothing for it but to meet what comes with courage, and a constant purpose to do the best which circumstances will admit with a worthy end in view.

If these interposing political difficulties can be got over, ample evidence has been gained of the capability of Japan to support and feed a large trade—one indeed only inferior to China, and far exceeding the proportions of size and population. The trade returns of Kanagawa for the year 1860, just completed, show a wonderful development of trade. Even irrespective of official interference, restrictions, and obstructions of every conceivable kind, the amount of trade for a port only opened to foreigners eighteen months is truly surprising. At first there was little or no demand for imports. The native dealers were ready to sell for money, but willing to buy nothing, unless such things as they had been accustomed to obtain from China, such as spelter, dyewoods, and a few medicines; but the vexed question of currency, and the exchange of hyaboos for dollars, together with the stoppage of business at Shanghae from the insurrectionary troubles—evils as they apparently were—worked for good in Japan, and materially helped to force both cotton and woollen manufactures into the market at remunerative prices, and soon a regular business was established at Kanagawa, especially in “camlets,” shirtings, chintzes, and American drills. From the last year’s experience, therefore, we may, as the British consul at the port suggests, very safely draw two important conclusions:—1st. That the Japanese are really in want of certain produce and manufactures superior to their own, or which they do not possess at all; and 2nd. That they are able to pay remunerative prices for them, provided an export trade flourishes. A total of 824,000*l.* worth of exports, by the official returns, appears as the declared value in 1860; but as these are calculated at 4*s.* 2*d.* per dollar, while the current rate was 5*s.*, and the declared value was undoubtedly from 20 to 25 per cent. below the invoice, nearly 50 per cent. may fairly be added on these two accounts, making the export upwards of 1,200,000*l.*—considerably more than Shanghae showed in 1844-5, the first years it was opened, although it now possesses a trade of some twenty millions sterling.

Nor is it unsatisfactory to find how large a proportion of this new trade has fallen to the share of the British. Although America presents peculiar advantages for a direct trade with Japan—seeing that passages from San Francisco to Kanagawa have been made in 35 days—yet, by reference to these returns, the direct trade with great Britain and its colonies will be seen to have taken the lead. Fifteen vessels arrived from the latter, and 28 took their departure for the same destinations; whereas American direct trade had but 6 arrivals and 5 departures, and the Dutch numbered but 2 of the first and 1 of the last. So we need have no fear of Great Britain holding her accustomed place in the commerce of the East, even in this new field, with long odds in favour of our

most enterprising rivals the Americans. For the larger development of the resources of trade here in Japan there only requires the neutrality of the Japanese ruling classes and Government; and if to this were added a bank for European and American credits, and a regular mail-service, with a good survey of the eastern coast, it might safely be predicted that within five years a trade, both export and import, only second to China, would be fully established, the main staple of which would be in some degree the same: tea and silk for exports, and cotton goods for imports. But in Japan there are other products more accessible and available, if the native Government would but allow the export; and there is a greater aptitude among the Japanese for variety of import articles than the stolid conceit of the Chinese and their slowness to learn will admit.

Notes on the Vegetable Productions of Japan, taken during a Ten Day's Journey into the Interior.

The vegetation of Japan is remarkable for the immense variety of trees and shrubs growing throughout the length and breadth of the land. Three-fourths of these may be said to be evergreens, giving the country almost as fresh an appearance during the winter months as in summer. The country travelled through during our trip is probably second to none other in point of general vegetation, from the lowest valley to the mountain summits one dense mass of luxuriant trees and shrubs. Trees of considerable dimensions are met with, consisting of pines, oaks, maples, &c. Others attaining a lesser size, viz., beech, lime, alder, chestnut, &c., give a pleasing variety of foliage. The main roads of Japan are planted, wherever practicable, with pine-avenues. These trees often attain a height of 150 to 180 feet, their upper branches forming a perfect covered archway. The splendid effect thus produced by miles of noble trees can scarcely be exaggerated. *Cryptomeria Japonica* (the cedar of Japan), must undoubtedly be placed as one of the finest trees found in Japan, if not the finest of all. It grows throughout the entire empire, attains a great height and circumference, and in point of beauty of growth is unsurpassed.

Amongst many splendid specimens met with, I noticed the following as being most striking:—

1. *September 6th.*—On the main road from Ha-too-ji-ku to Hakoni. An avenue of several miles in length. Three trees measured in succession were 15 ft., 14 ft. 6 in., 13 ft. 6 in. in circumference, at 3 ft. from the ground.

2. *September 14th.*—On the road from Misima to Atami we fell in with three noble specimens, standing singly in the midst of a small village; about 150 to 170 ft. high, and 16 ft. 6 in. in circumference, 3 ft. from the ground.

3. *September 14th.*—Near Atami we passed a forest, remarkable for the peculiar straight trunks of the trees. They had grown in close proximity to each other, and consequently lost the greater portion of their branches. The effect produced was very similar to that of an immense number of ships' masts.

Mount Hakoni, clothed to the summit with forests of *cryptomeria japonica*, *thuyopsis dolabrata*, *thuyas*, *retinosporas*, &c.

A few of the most striking Trees, Shrubs, &c., met with during our Trip.

- Acer* (maple), many species. Common.
Asplenium fontanum?
Asplenium, 3 or 4 species unknown.
Abies leptolepis (larch). Mt. Fusi-yama.
 „ „ *firma*, 100 to 120 ft. „
 „ „ *bifida*, 90 to 100 ft. „
 „ „ *inaga*, 60 to 70 ft. „
Alnus glutinosa? (alder). The foot of Mount Fusi-yama and other parts.
Aralia edulis. Near Atami.
 „ „ *Sieboldii*. Com. in many parts.
Aucuba japonica. Common.
 „ „ *foliis variegatis*.
Azalea. Splendid bushes; plentiful in all the forests at a low elevation.
Benthania japonica. Mount Hakoni.
Berberis japonica. Seen throughout the whole journey.
Bronssonetia papyrifera. Planted on the road-sides.
Camellia japonica. Splendid trees; common throughout the valleys.
Cephalotaxus, sp. Mount Hakoni, resembling *C. Fortunei*.
Cephalotaxus macrophylla. Common in the lowlands; not seen at a high elevation.
Cephalotaxus, sp., with leaves very pointed and sharp at the points. Mount Fusi-yama.
Citrus japonica. Com. in the valleys.
Clematis, 2 or 3 sp., not seen in flower.
Cryptomeria japonica. Seen everywhere in the valleys, and on Mount Hakoni at 7000 ft. elevation. Not found on Mount Fusi-yama.
Cycas revoluta. Common in all temple gardens.
Convolvulus major. Grown in every garden.
Dentzia scabra. Common on hill-sides.
Diervilla, 2 or 3 sp. On Mount Hakoni. Not seen in flower.
Daphne japonica, *foliis variegatis*. Near Missima.
Eriobotrya japonica. Omio.
Fagus sylvatica? beech. Foot of Mount Fusi-yama and Mount Hakoni.
Forsythia suspensa. Near Kanagawa.
Hibiscus mutabilis? Single, purple and white, as well as double; common throughout the whole trip.
Hydrangea japonica. Mount Hakoni.
 „ „ *bracteata*. „
 „ „ *hirta*. „
Illicium religiosum. Near Odawara.
 „ „ *floridanum*. „
Indigofera, sp., 1 red, 1 white. Unknown. Near Numadz.
Iris. Planted on the ridges of the thatched cottages.
Juniperus, sp., 30 to 40 ft. Unknown. Atami.
Laurus cinnamomea. Omio, and in most forests.
Lilium, sp. Foot of Hakoni.
Magnolia, sp. Mount Fusi-yama. Foliage similar to *M. macrophylla*.
Orontium japonicum. Common throughout the woods. Variegated. Varieties grown in pots.
Onoclea, new sp. Foot of Fusi-yama.
Paulownia imperialis. Mariyama and other parts.
Pernettya, sp. nova. Berries pink. Fusi-yama.
Pinus massoniana. Common throughout Japan. The road-side avenues are formed of this pine.
Pinus parviflora. Common on Mount Hakoni.
Pittosporum tobira. A common shrub in the forests on the lowlands.
Podocarpus macrophylla. Foot of Mount Hakoni; also near Kanagawa.
Poinciana regia. Odawara.
Quercus cuspidata. Common.
 „ „ *glabra*. Near Hara.
 „ „ sp. unknown. Large foliage. Common between Hakone and the foot of Fusi-yama.
Retinospora obtusa, 30 to 40 ft. Common throughout our trip.
Retinospora pisifera, 30 to 40 ft. Common.
Rubus, sp. unknown. Foot of Mount Fusi-yama.
Spiraea Thunbergii. Common in most valleys.
Spiraea, sp. unknown. Fusi-yama.
Scyadopytis verticillata. Found wild near Kanagawa. Cultivated at Atami.
Smilax, sp. unknown. A common plant rambling over the mountain slopes.
Thea Bohea, the tea-plant. Straggling bushes seen throughout our journey. Plantations near Omio.
Thuyopsis dolabrata. Forests on Mount Hakoni.
Thuyopsis dolabrata, variegata. Grown in the temple at Omio.
Thuya pendula. Mount Hakoni.
 „ „ *orientalis*. Foot of Mount Hakoni.
Weigelia roses. Foot of Fusi-yama.
Weigelia, sp. nova. Foot of Fusi-yama.
Wisteria japonica. Rambling throughout the woods.
Woodwardia japonica. On the slopes of Mount Hakoni.

Addenda.

- Adiantum*, sp. nova. Mount Hakoni.
Bambusa metake. Growing wild in the lowland forests.
Bambusa metake, variegata. Cultivated in gardens.
Buddlea, sp. Grown largely at the foot of Fusi-yama for the manufacture of paper.
Chamaerops excelsa. Commonly seen throughout the trip; also at Onio, at the foot of Fusi-yama.
Corylus avellana? the hazel. On Fusi-yama.
Castanea vesca. Near Messina.
Eucorymus Japonica. A common shrub.
Funckia, 2 variegated sp., at the foot of Hakoni.
Gardenia florida. Common throughout.
 radicans. Ditto.
Ilex, sp. unknown; 10 to 12 ft. Mount Hakoni.
Musa paradisiaca, the plantain. Muriyama and Messina.
Nerium japonicum. Muriyama.

The Vegetation of Mount Fusi-yama.

- 14,000 ft.—No vegetation.
 12,000 ft.—One or two dwarf compositæ.
 8,000 ft.—Larch, *Abies leptolepis*, very stunted; 2 to 3 ft.
 6,000 ft.—Larch, *Abies leptolepis*; 30 to 40 ft. Pine forest, *Abies firma*, 90 to 100 ft.; *Abies bifida*, 70 to 80 ft.
 2,000 ft.—*Abies laura*, 50 ft.
 Beech, alder, lime, hazel, &c.
 Grass and fern.

Notes on the Agricultural Crops and Vegetables of Japan.

The main crop of the country we passed through is rice, grown principally in low, marshy valleys, and irrigated in the same way as in China. In cases, however, where the land does not admit of irrigation, a species of rice is grown, which succeeds perfectly on dry soil. This latter crop is much less productive. Having both kinds at their disposal, the Japanese cultivate enormous quantities. Hills of considerable elevation are often terraced to the summit, producing a valuable crop, and giving the country a most picturesque appearance.

Two species of millet are grown largely; one about 3 to 4 ft. high, and another 5 to 6 ft. The former is sown either broad-cast or in drills, similar to European cornfields; the latter is transplanted in single rows, generally round the outer edges of the dwarf millet.

Egg-plant (*Solanum esculentum*) is largely grown for the sake of its fruit, which is much eaten.

Caladium esculentum, sweet potato, and ginger, are all considerably grown in the country we passed through.

We did not pass through any part of the cotton or tea producing countries, although occasional fields of the former, and shrubs of the latter, were met with.

All the vegetables of Japan are more or less flavourless. It would be a matter of considerable interest to ascertain the cause of this. From the little opportunity I have had of judging of the Japanese mode of cultivation, I consider the secret to be this—that they over-manure their growing crops, and thereby cause them to grow rank. In England similar instances may often be seen; for instance, a field of turnips over-manured runs away to leaf, and forms but a small stringy root.

A few of the Crops noticed in the Country we passed through.

Rice; two species.

Millet; two species.

Sweet potato (*Dioscorea batatas*).

Egg-plant (*Solanum esculentum*).

Caladium esculentum; the root, leaf, and stalk, eaten by the Japanese.

Indian corn, in small patches,

with variegated leaves. One patch only seen in the neighbourhood of Fusiama.

Beans; several kinds, both dwarf and running.

Peas; grown largely in fields.

Carrots, turnips, onions, pumpkins, cucumbers, gourds, and chilis, besides numerous other little things peculiar to Japanese taste.

The Fruits of Japan.

Nothing is more disappointing to a European visiting Japan, for the first time, than the scarcity and insipidness of its fruit. No country can be more favourably situated. The soil is very rich and productive, and the climate is all that can be desired. My experience will barely admit of my giving an opinion on the subject. I consider it arises chiefly from the fact that the Japanese take no pains to improve their fruit-trees; the same varieties have probably been grown year after year. I am further strengthened in this opinion by finding that one or two varieties of each kind only exists. Peaches, pears, grapes, &c., one kind only is grown, or if more, they are mere varieties of each other, one a little smaller or larger, but no difference in point of shape, colour, or flavour.

In no other way can I at present account for the dearth of fruit, and the inferior quality of what is produced, in a country like Japan. I feel confident that a few of the European improved varieties of fruits planted in Japan would prove that the soil and climate are well adapted to their growth, and that it is only cultivation and improvement of trees that are required to render Japanese fruit second to none.

Fruit met with.—Cherries, chestnuts, figs, grapes, oranges, melons, pears, plums, peaches, persimmon, and walnuts.

Extract of a Letter from Mr. Robinson, H.M.S. Berenice, I.N., in reference to the Coal of Japan.

"The coal supplied H.M.S. *Berenice* at Nagasaki was a fourth-rate quality; if anything, inferior to the Australian and American coals supplied us at Hongkong from H.M. stores. It made much clinker and dirty ash, the fires requiring frequent dressing. We consumed on an average 23 tons a day, against 18 tons of good English steam-coal.

"The coal of Kanagawa is of a better quality in every respect; a better steaming coal, less dirty, and fires requiring less cleaning; the average consumption being 22 tons a day. Both coals should be shipped dry, for if stowed damp are liable to ignition. The coal of Hakodadi I have not seen."

Periods of Ebullition of the Sulphur-Baths at Atami.

16. (Day of arrival.) 10 P.M.

17. 6 A.M. (lasted $\frac{1}{2}$ hr.); 11 A.M. (20 min.); 3 P.M. ($1\frac{1}{2}$ hr.); 5 $\frac{1}{2}$ P.M. (15 min.); 7-40 P.M. ($\frac{1}{2}$ hr.).

18. 6 A.M. (lasted $\frac{1}{2}$ hr.); 10 $\frac{1}{2}$ A.M. (1 hr.); 3 P.M. ($\frac{1}{2}$ hr.); 7 to 8 P.M., with short intervals; 12 P.M.

19. 4 A.M.; 6 A.M. (lasted 5 min.); $8\frac{1}{2}$ to $10\frac{1}{2}$, with short intervals of intermittence; $2\frac{1}{2}$ P.M. ($\frac{2}{3}$ hr.); 8 P.M. ($\frac{1}{3}$ hr.); 12 P.M.
 20. 10 A.M. (lasted $\frac{1}{2}$ hr.); $2\frac{1}{2}$ P.M. (1 hr.); 6 to 7 P.M., with short intervals.
 21. 3 A.M.; 8 A.M. (lasted $\frac{1}{2}$ hr.); 9 to $10\frac{1}{2}$, with abatement; 3 to 4 P.M., ditto; 7 to 9 P.M., ditto.
 22. 6 A.M. (lasted 1 hr.); 10 to 12 A.M., with intervals; 3 to 4 P.M., ditto; 7 to 9 P.M., ditto.
 23. 6 A.M. (lasted $\frac{1}{2}$ hr.); $10\frac{1}{2}$ to 12 A.M., with intervals; 4 P.M.; $8\frac{1}{2}$ P.M.
 24. 6 A.M. (lasted 1 hr.); 10 A.M. (1 hr.); 3-45 P.M., with great violence; 8 P.M. (1 hr.)
 25. 6 A.M. (lasted $1\frac{1}{2}$ hr.); $10\frac{1}{2}$ A.M. (1 hr.); 3-15 P.M. (1 hr.); 8 P.M. (1 hr.); 12 P.M.
 26. 3 A.M.; 6 A.M. (lasted $\frac{1}{2}$ hr.); $9\frac{1}{2}$ P.M. ($\frac{1}{2}$ hr.); 3 P.M.; 8 P.M. (1 hr.)
 27. $5\frac{1}{2}$ A.M. ($\frac{1}{2}$ hr.). Left Atami.

Note.—There is said to be an interval of rest either at new moon or full, and the landlord of the hoïyen said he had kept a book for a long period, noting the ebullitions every day, which would show this. It could not be found at the moment, and was sent after me two or three weeks after my return to Yeddo; but it had all the appearance of having been made up merely to send me, and, with some experience how little trust can be placed in Japanese conscientiousness, I confess I put no faith in its authority or accuracy. The sources are said to show greater or less activity with ejection of steam and pumping of water at six periods in the 24 hours; at 6, 10, and 3 o'clock, twice repeated. But as will be seen by the few days' diary, there is considerable irregularity, although so many times each day, and at those hours more frequently than at any others.

APPENDIX.

XXIV.—*First Ascent of the Tian-Shan or Celestial Mountains, and Visit to the Upper Course of the Jaxartes or Syr-Daria, in 1857.* By P. P. SEMENOF, Fellow of the Imperial Russian Geographical Society. (Translated from the Russian, by JOHN MICHELL, Esq.)

THE skeleton of the continent of Asia is formed by four gigantic and almost parallel mountain-ranges, severally known as the Altai-Sayan, the Tian-Shan, the Kuen-Lun, and Himalayan.

Only two of these systems—the most northerly or Altayan, and the most southerly or Himalayan—have as yet been explored, the former from Siberia by Russian men of science and travellers, the latter by English expeditions from India. The Tian-Shan and Kuen-Lun, situated in the interior of the largest continental mass of the terrestrial globe—the one in 42° , the other in 36° of northern latitude—have hitherto been inaccessible to European scientific travellers. At the same time these gigantic mountain-chains which rise from the zone of apricot and granate trees, of rice and of cotton, far beyond the limit of perpetual snows, are perhaps of greater scientific interest than the interior of Africa, with which we are now somewhat acquainted through the bold explorations of Barth, Vogel, Livingstone, and others.

Numerous historical events of remote antiquity connected with the interior of the Asian continent—that cradle of so many tribes and nationalities—could naturally have contributed some information to geographical science, and these testimonies of history have been fully investigated by Klaproth, Ritter, and Humboldt.

Klaproth was the first to show that the Tian-Shan and Kuen-Lun were totally distinct and independent ranges; Ritter systematically arranged and



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critically elaborated all the facts relating to the geology of the interior of Asia, and particularly with reference to the Tian-Shan; while Humboldt described with learned minuteness the general features of the orographical formation of the country. But the facts thus investigated by the most eminent scientific men of this age were meagre and insufficient; they had only been casually supplied by men who had travelled without any scientific object, or by such strangers to science as Chinese travellers and Buddhist missionaries of the 16th and 17th centuries. The Chinese commission of the 18th century which, under the guidance of Jesuit missionaries, made a cartographical survey of the Si-Yui or western country, and even determined astronomically a point on the lake of Issyk-kul, was the only approach that had been made to anything like a scientific exploration. Nor have the Jesuits, to my knowledge, left any personal account of their travels in the vicinity of the Tian-Shan; and their maps, except the points astronomically fixed, are founded on the dry and verbal itineraries of their Chinese assistants. Consequently our acquaintance with the orography and geology of the mountain-systems of Inner Asia has hitherto been of a very limited nature. Humboldt has very aptly compared it to the state of our knowledge of the geology of the moon.

Encouraged by Humboldt, and furnished with means by the Imperial Russian Geographical Society, I proceeded, in 1857, to explore the Tian-Shan and upper course of the Syr-Daria.

The lake Balkhash, and the deep hollow which connects it with Ala-kul Lake, its dried-up extremity, separate the mountain-systems of Central Asia from the uniform Kirghiz Steppe, which only occasionally rises in very low mountain-groups. A change of scenery, therefore, the more appreciable from its sudden richness and beauty, awaits the traveller, who, passing between the lakes of Balkhash and Ala-kul, gains the summit of the low and isolated group of the Arganatin hillocks, situated to the north-east of the mouth of the river Lepsa. And while to the west of these elevations the landscape fades out of sight in the silvery surface of Lake Balkhash, and the arid evenness of the plain beyond, on the south-east the eye is dazzled by the whiteness of the snow-clad mountains, which, towering to the skies, extend in bold outline from north-east to south-west. This mountain-system is called the Alatau; and to distinguish it from other ranges of the same name, it will be designated throughout this Paper as the Djungarian Alatau, from its having been in the 18th century the bulwark of the flourishing kingdom of Djungaria.

This mountainous region, visited between the years 1840 and 1851 by the Russian travellers Karélin, Schrenk, Kovalevsky, and Vlangali, is separated and sharply defined on the north by the depressed zone of Balkhash and Ala-kul, on the south by the low and broad valley of the Ili, while on the east it is connected with Bogdo-Ula, the most elevated knoll of the Tian-Shan system. This mountainous surface is formed by the intersection of two axes of elevation, one of which, the Iren-Habirgan, extends straight from east to west, parallel to the Tian-Shan, with which it is connected by the Bogdo Knoll; while the other, or Alatau proper, stretches from north-east to south-west, intersecting the former at a sharp angle. The axis of elevation of the Iren-Habirgan forms, to the west of its intersection with the Alatau, several parallel chains, between which, at an absolute height of 3000 feet, on a fertile and well-watered plateau, stands the town of Kopal, a flourishing Russian settlement, established in 1847, for the protection of the great Kirghiz horde against the bold incursions of the Dikokamanni Kirghizes. Another equally flourishing agricultural settlement, though only founded in 1855, is situated on the valley of the principal axis of the Djungarian Alatau, at the upper course of the river Lepsa, at an elevation of 2400 feet. High above the valleys rise the snowy summits of the Djungarian Alatau, whose mean elevation is determined at 6000 feet above the level of the sea, while, according to Schrenk, the limit of their altitude may be taken at 12,000 feet. The perpetual snows

of the Djungarian Alatau, and particularly those on the north-western slopes of that range, give rise to innumerable rapid and turbulent streams, which carry irrigation and fertility to the picturesque valleys and plains below—the latter being called the Semirechinsk region, from the seven rivers fed by these mountain-torrents. It is only on the west, in the direction of Lake Balkhash, that the Semirechinsk region merges gradually into a sandy and barren steppe, stamped with the appearance of having at some remote age been the bed of an extensive inland water-basin, now represented by Balkhash Lake and the two lakes of Ala-kul. With currents becoming more and more sluggish, these seven rivers are bordered by high reeds tenanted by boars, tigers, and other animals; while all around extend arid dunes of sand and salines covered with the characteristic *Anabasis Ammodendron* and other saline flora. Thus only two of the seven rivers reach Balkhash, and one of these is the Lepsa.

The Ili, one of the most considerable rivers in Central Asia, separates the Semirechinsk region from that lying more to the south, which the first Russian colonists, in 1854, called the Trans-Ilian country.

In the Trans-Ilian region the traveller is struck by the strongly-marked contrast that exists between the low and hot valley of the Ili and the gigantic snowy Alatau range, extending 35 to 45 miles east and west beyond the river, and which for distinction we term the Trans-Ilian Alatau. The Ili river flows from east to west through a broad valley of about 100 miles in breadth, and of an absolute elevation of more than 1000 feet—a measurement determined by the temperature of boiling water at the Russian ford across the Ili. Its banks are low and perfectly level, and bordered occasionally by high trees of the species *Elaeagnus angustifolia*, *Populus pruinosa* (a peculiar poplar), *Fraxinus* sp. (dwarf elm); also by bushes of the most varied character—the red barberry, *Halimolendron argenteum*; species of the *Astragalus Robinia*, *Tragopyrum*, *Salix*, &c. The breadth of the river is 1050 fathoms English, and has a rapid current. At about 13 miles below the ford it intersects a porphyritic plateau connected with the porphyritic groups of the lower ranges of the Djungarian Alatau. The Ili has eroded a deep bed through this hard porphyry rock, forming picturesque bends between overhanging cliffs. Beyond this romantic defile its banks again become depressed, while the neighbouring country assumes the steppe character of the Balkhash region, its surface becoming covered with sand, salines, and the *Anabasis Ammodendron* and other saline plants. Through this country the Ili flows on for 165 miles until it falls into the Lake Balkhash, where it gives rise to a low delta, overgrown with reeds of impenetrable thickness, in some places of a height of 17½ feet. Above the pass, however, to the very base of the range, the valley of the Ili presents a rich and fertile region, in some places well adapted for permanent occupation, and highly susceptible of cultivation. This is shown by the fact of Chinese penal and military settlements occupying the entire upper portion of the Ili valley, between the Iren-Habirgan and the Tian-Shan, from the junction of the rivers Charya and Kunurulen upwards to the base of the Bogdo-Ola, in which the Khash and Kanges rivers, tributaries of the Ili, take their rise. The numerous confluent of the Ili flowing from the Iren-Habirgan and the Nan-Shan (the continuations of the Trans-Ilian Alatau) are exhausted before they reach the Ili in watering fields and supplying irrigationary canals. Chinese settlements are thickly scattered throughout the valley; and each village, and every military station, is picturesquely encircled by groves of thick and tall trees planted by the Chinese settlers since the fall of Djungaria, at the latter end of the last century. This proves that the artificial cultivation of timber is possible even in so dry a climate as that of Central Asia. Among the vegetable productions of the Ili valley we may mention the vine, rice, maize, melon, water-melon; and fruit-trees, such as the apricot, pear, apple, plum, &c. Even pomegranate-trees, when carefully sheltered and protected in winter, produce fruit.

Fort Vernoe, the Russian settlement situated in the Ili valley, 47 miles due south from the Ili ford, at the base of the Trans-Ilian Alatau, and at an absolute elevation of not more than 2000 feet, is therefore established under extremely favourable conditions. The Trans-Ilian Alatau, extending from east to west in a direction parallel to the course of the Ili, rises abruptly from the plain like a gigantic wall. From the meridian of the western extremity of Issyk-kul, and almost to the meridian of the eastern extremity of that lake, the entire ridge is covered with perpetual snow. At the centre of this ridge rises the triple-headed giant *Tamaragn-Tal-Tcheku*, whose altitude I consider scarcely inferior to that of Mont Blanc: from this centre two arms stretch out, gradually dipping until their never-melting snows are lost within the meridians of the extremities of Lake Issyk-kul. Being but slight indentations, the whole of the mountain-passes of this elevated centre of the Trans-Ilian Alatau have an altitude of 8000 to 10,000 feet, and are therefore almost impassable by large detachments of troops. Fort Vernoe is situated at the point where the turbulent and impetuous Almatinka emerges from its mountain-bed: the valley of this river is clad with natural orchards of apple and apricot trees bearing excellent fruit. The settlement, which has been formed by Cossacks and immigrant peasants, already consists of 4000 inhabitants, admirably located. The timber for building-purposes is supplied by the mountain-slopes and transverse valleys, which, at elevations of 4000 to 7500 feet, are overgrown with the Siberian fir. The two Aksai and the two Almatinka streams issuing from the mountain valleys near Vernoe afford an abundant supply of water for irrigation, and have already mised agriculture to a very flourishing condition.

Between the meridians of the extremities of Issyk-kul Lake the Trans-Ilian Alatau consists of two parallel granitic chains, separated by a deep longitudinal valley occupied by depository and metamorphic formations. A transverse knoll likewise covered with perpetual snow connects the two chains at the meridian of the centre of the lake. A longitudinal valley extending to the west of this knoll is watered by the Kebir River, one of the branches of the Tochu, while to the east flows the Tchilik, an affluent of the Ili, and which, emerging on the meridian of the eastern extremity of Lake Issyk-kul, continues its course northwards through a wild transverse cleft of the suddenly depressed northern chain.

The southern chain of the Trans-Ilian Alatau is separated from the higher and parallel range of the Tian-Shan by a deep and extensive hollow forming Issyk-kul Lake, and by the longitudinal valleys of the Tuba and Djirgala, rivers flowing into Issyk-kul. The plateau, indented by the hollow which contains the waters of Lake Issyk-kul, is situated at an absolute elevation of 4000 feet, and is from 55 to 65 miles wide; while the lake itself with a length of 120 miles has a breadth of 35 to 45 miles. Although the shortest distance from Fort Vernoe to Lake Issyk-kul by way of the Almatin pass across the two chains of the Trans-Ilian Alatau is not more than 60 miles, yet the mountain-passes of the two chains between the meridians of the extremities of Lake Issyk-kul, exceeding 9000 feet in absolute elevation, do not afford convenient access to that lake, and necessitate considerable detours.

When, therefore, in May, 1857, I determined to penetrate into the heart of the Tian-Shan range, I was obliged to choose another way. My caravan consisting of 25 men, 30 horses, and 16 camels, required the selection of the most convenient, and consequently the most circuitous route; the distance to the eastern extremity of the lake could not be estimated at less than 200 miles. The road first extends to the eastward through a valley and along the base of the northern chain of the Trans-Ilian Alatau, crossing the rivers which rise in the latter region trends on until it reaches the Tchilik River, which it passes, turning immediately to the s.s.w., first across the two parallel and inconsiderable ridges in which the northern chain of the Trans-Ilian Alatau becomes gradually merged, and issuing at last on the high plateau of Santash.

The Santash is a high marshy plain, 5500 feet in elevation, disposed at the base of the lower range of the Tian-Shan Mountains. On reaching Santash on the 18th June, we found it still partially covered with masses of snow. Its flora presents a subalpine character, and consists of plants such as the *Leontopodium alpinum*, *Thermopsis alpina*, *Myosotis alpestris*, *Cerastium alpinum*, *Primula nivalis*, *Vicia biflora*, &c.

Until the end of June the nights remained cold, with hoar-frost towards morning; while in the warm valley of the Ili where the snow remains two months on the ground, the frost had entirely disappeared, and spring flowers had been in bloom since the latter part of February.

The character of the Santash tableland is marshy; at the very foot of the Tian-Shan lower range occurs a small lake whose light-blue surface is nearly always covered with countless flocks of wild ducks and cranes. On the western edge of the lake we found a pile of stones, raised by human hands, and from which the name of Santash or the "numbered stones," given to the surrounding country, is derived. According to a legend of the Dikokamenni Kirghizes, Tamerlane, on his march eastward, passed by this spot with his troops. Expecting in all probability a speedy engagement with his enemies, and wishing to ascertain the strength of his innumerable host, he directed each warrior to take a stone and deposit it in one place; and thus a colossal heap was soon formed. On their return, the victorious, though partly annihilated, troops of Tamerlane recrossed the Santash plateau. This time the Khan ordered each of his surviving followers to remove a stone from the heap they had raised; and in this manner, the pile assuming its present dimensions, showed the number of warriors who had fallen on the battle-field, and served as a monumental record of their deeds and their memory. The march of Tamerlane from Tamarak and to the valley of the Ili is not a fabrication. That event occurred at the commencement of the fifteenth century; but the conqueror did not penetrate beyond the lake of Borotal. This interesting legend is historically important, for it fixes the direction of the march of Tamerlane.

The lower ranges of the Tian-Shan or Celestial Mountains rise on the south immediately over the Santash Plateau; but there is not much grandeur in the view from this point, for beyond the foremost, not very elevated mountains, the eye can neither discover the principal range nor its snow-clad summits; small snowy patches appearing only on the more distant peaks. The lower ranges of the Tian-Shan slope rather abruptly towards the Santash Plateau, covered with a luxuriant light-green verdure and bright flowers of the sub-alpine zone. The conifers belong exclusively to the *Picea Shrenkiana*; and of the leafy family, the most conspicuous representative is the mountain-ash. The bushy species are numerous, and consist of the mountain-barberry (*Berberis heteropoda*), of several descriptions of the honeysuckle (*Lonicera*), of the tasteless alpine currant (*Ribes alpinum*), &c. &c.

The sleek flocks of the Boger Kirghizes were grazing on the rich subalpine meadows of the Tian-Shan, and numerous "aûls," or tents of white felt, crowned each hillock and dotted the margin of the lake and surface of the plateau when we approached it. Burambai, the aged chief of the tribe of Bogu, had hastened to meet me the day before with expressions of loyalty towards the Government of Russia. Having three years previously sworn allegiance to Russia, the Bogus received me as the welcome and long-expected representative of the protection they had sought against the inimical and powerful tribe of Sam-Bagish, by which they had been long oppressed and at last driven, in the spring of 1857, from their hereditary pastures and camping-grounds along Issyk-kul, beyond the Santash to the very borders of China and the great Horde territory. Although I at once endeavoured to persuade Burambai and his Beys that my mission was of a character purely pacific, namely to survey the Tian-Shan and take views, yet they obstinately persisted to regard me in the light of a representative of the power of Russia, whose influence they had already beneficially

felt; for an exaggerated rumour of the approach of a Russian detachment had caused their hated and dangerous foes, the Sara-Bagish to seek safety in flight beyond the Tian-Shan, abandoning the crops on their fields, and clearing the country they had seized to a distance of 170 miles. Consequently Sultan Tezek, one of the three chiefs of the Great Horde, who had in reality arrived with 800 horsemen to the aid of Burambai, and myself were received as deliverers: a circumstance which greatly facilitated the attainment of the object of my journey.

Two or three days were spent in preparations for the ascent of the Tian-Shan; and leaving the camels and baggage under guard with Burambai, I left on the 21st June accompanied by an artist, 16 Cossacks and 2 guides of the Bogu tribe, all mounted on fresh horses.

From the Santash Plateau we descended a little towards the Tiub River, which, emerging here from a narrow transverse valley of the Tian-Shan, bends away to the westward at a right angle through a broad longitudinal valley between the Celestial range and the Trans-Ilian Alatau, ultimately reaching Issyk-kul Lake. After fording the impetuous waters of the Tiub, a bridle-path led us up to the Kyzyk-kia, a comparatively low pass over the water-parting between the parallel courses of the Tiub and Djirgalan Rivers. The water-parting abutting here on the lower ranges of the Tian-Shan, extends between the two rivers in a low ridge called Tasma, and at last terminates in Lake Issyk-kul in a low promontory and spit between the mouth of the Tiub and Djirgalan. The Kyzyk-kia, "*Red Road*," is so called from the occasional cropping out of a reddish clay; no rocky formations were visible. The summits of the Kyzyk-kia are picturesquely clad with copses of the silver-fir, and the view hence, embracing the foremost snow-white ridges of the Tian-Shan, is one of unequalled grandeur. Towards the west, the eye is lost in following the broad and desert valley of the Djirgalan, which notwithstanding its majestic dimensions and frequent bends glistening in the rays of a burning sun, is both dreary and monotonous. The broad plain of the valley has an appearance of aridity and barrenness, due to the scorching effects of the sun; and with the exception of an interminable uniform row of trees which marks the course of the Djirgalan, and of its affluent the Turgen-Aksu, no woodland occurs to enliven the scene. We frequently met natives in this part of the valley; but their appearance was not calculated to excite anything like pleasure, for men, women, and children were tattered and pale, and in the last stage of destitution and misery. They were Bogus, who having been captives of the Sara-Bagish had recovered their liberty on the rapid flight of their victors.

The distance from Santash to Turgen-Aksu is reckoned a day's journey, or 20 miles. On the 22nd June we continued our route westward along the dreary valley of the Djirgalan. Crossing three rivers called Djerges, we reached, after travelling 17 miles, the Aksu River, an affluent of the Djirgalan. This river is celebrated among the Dikokamenny Kirghizes for the healing properties of its hot springs, to inspect which I turned off to the southward up its narrow valley. About 3 miles from the point where the river issues from the mountain, the valley divides into two branches; one, extending to the southward, leads to Altyn-Arassan, the most distant of the two springs; the other running 3 miles to the s.e. brings the traveller to the nearest or Alma-Arassan spring; we therefore chose the latter. The path wound gradually up the mountain, bringing into view in the distant western horizon the blue and boundless surface of Issyk-kul Lake with its two characteristic bays and projecting headland. The scenery became gradually wilder and the prospect less extensive; following the narrow bridle-path we looked down on the swift and foaming river below rushing through its mountain-bed. The outcropping strata were of granitic formation, uplifting strongly inclined layers of mountain-limestone. Dark woods of fir occurred occasionally on the landlips.

Having at last reached the Arassan, we commenced a steep descent towards the river Aksu by a winding path between the most stupendous rocks. The pathway has been with great difficulty cut out of the granite, and is only passable at the hazard of life. The horses had to be led, for the smooth rocks and granite steps rendered their progress both difficult and imminently dangerous. The open space round the spring of Alma-Arassan is not more than 15 fathoms in breadth from the river to the cliff. This warm spring issues from under an immense rock of granite into an elliptical basin 8 feet in length, $3\frac{1}{2}$ in breadth, and 3 to 5 feet deep, from which again it runs in a narrow stream into the cold and impetuous Aksu. I found the temperature of the Arassan Spring at 7 o'clock in the evening to be 40° with an atmospheric temperature of 15° ; that of the Aksu being 11° . The absolute elevation of the spot is about 5400 feet. The spring is surrounded by shady trees, among which we noticed some artificially planted apple-trees, whence the name of the "Apple Arassan." The willow is also there, bending gracefully over the water. Very few bubbles were apparent on the surface of the spring, but a slight smell of sulphuric hydrogen was perceptible. The trees around are considered sacred, and are covered with innumerable rags of every variety of colour, the offerings made by the Dikokamenny Kirghizes to the spirit of the spring. A kind of cavern formed by slabs of granite stands in close proximity its interior is low and much dilapidated, and contains benches and an oven. The door of the cavern is of wood, and remarkable for the inscriptions in Tibetan characters which it still exhibits in excellent preservation. The Tian-Shan Arassan spring rises under conditions very analogous to those which produce the springs of Taragatai and of the Djungarian Alatau; namely from the Plutonic series.

On the 23rd June we left the Arassan, losing a horse in the descent. While our little caravan was recovering from the confusion which this loss occasioned, I proceeded alone along the bottom of the Aksu valley, and, following all its sinuosities, at last quitted the foremost ranges of the Tian-Shan. My comrades soon rejoined me, and travelling 27 miles we bivouacked for the night on the Djity-Uguza River, which disembogues in Issyk-kul Lake. The Djity-Uguza takes its rise in a very picturesque transverse valley which opens out an extensive view of the snow-clad summits of the Celestial range. Opposite the very centre of this valley rises the two-peaked Uguz-Bash (bullock's head), clad, like the Yungfrau of the Bernese Alps from its summit to its base in a dazzling white mantle of eternal snow, yet surpassing that mountain in originality of form. To the right of Uguz-Bash we saw a row of rugged black rocks tipped with snow, and belonging probably to the principal range of the Tian-Shan. The broad foaming stream of the Djity-Uguz, strewn with wild rocks, frequently encircles emerald islets covered with a green luxuriant vegetation, forming a landscape of incredible beauty. The thick bushes of the banks and islands of the Djity-Uguz are of the species *Hipophæa rhamnoides*, *Lonicera* (woodbine), *Cotoneaster multiflora*, *Berberis heteropoda* (barberry), *Crataegus* sp. (hawthorn) and wild rose: all interwoven with the *Clematis orientalis*. A broad fertile plain stretches out in all directions, and being easily irrigated, is never allowed by the Kirghizes to be out of cultivation.

On the 24th June we crossed the Djity-Uguz, and shaped our course to the westward. A bridle-path gradually led us up the mountain, leaving on the right the flat and sloping hill of Orgochor, which projects into Issyk-kul Lake in the shape of a promontory. To the north-west and south-west the view spreads out in ever-increasing grandeur: to the north-west the eye could scarcely embrace the blue surface of Issyk-kul, reminding us forcibly of the lake of Geneva; while beyond it rose like a wall the perpendicular southern chain of the Trans-Ilian Alatau, with its small indentations and dazzling patches of perpetual snow. Towards the south-west again the principal chain of the Tian-shan, covered with a broad and brilliant mantle of snow, extends

in endless perspective. The most distant part of the chain being hidden from the traveller by the horizon, appears sinking with its snow-clad heights in the azure waters of the lake.

Ten miles from the Djity-Uguz the bridle-path between Orgochor and the base of the Tian-Shan begins to slope towards the river Kyzyl-Su. Travelling 8 miles farther, we reached the Zakhk River, where it emerges from the Tian-Shan, and turning to the southwards descended its valley. Beyond a distance of 7 miles the valley bifurcates, its scenery becoming extremely romantic. We were obliged to follow the western branch, or the Zakhk proper; the eastern is called Zaukuchak. Its picturesque banks are formed by gigantic cliffs of red conglomerate in regularly inclined strata. This locality is called Kyzil-Ungur, or the Red Cavern.

After fording the rapid river below the junction of the two branches, we proceeded to the south-west, along the valley of the Zakhk. The bridle-path passes under a steep escarpment of red conglomerate, and gradually ascends the elevated left bank of the river, avoiding the overhanging edges of the cliffs. The silver-fir, though frequently occurring on the slopes, is not yet predominant; and the ash, the willow, and the asp still contribute their grace and their foliage. From a south-westerly direction the valley now runs south; syenite replacing the red conglomerate, shows the traveller that he is intersecting the crystalline axis of the foremost chain of the Tian-Shan. Large masses of syenite which had rolled down from the loftier portion of the mountains obstructed the path, and rendered our progress extremely difficult. Three or four miles beyond, the path descended between wild rocks towards a mountain-torrent, fording which we gained the bottom of the valley. The scenery continually increased in majestic grandeur. The valley ascends rapidly and in a straight line towards the Tian-shan, affording a magnificent vista of the snowy summits at its head. The river flows rapidly down its steep bed and glistens in the sun's bright rays. Shady woods of silver-fir come down on either side to the margin of the stream, occasionally forming a broad dark-green barrier across the valley. Above the zone of coniferous trees rise bold ridges of syenite in forms jagged and castellated. Two cascades run down between them in a cloud of spray like the Stambach. The bridle-path along the bottom of the valley twice intersected a thick and impenetrable barricade of conifers. The stones and rocks are covered with a light green moss of the *sphagnum* species. The flora of the coniferous woods bears a subalpine character, marked by the plants—*Anemone alba*, *Thermopsis alpina*, *Primula longiscapa*, *Doronicum altaicum*, and by several species of the *Pedicularis*, *Gleucomia*, *Speciosa*, &c. The valley retains the same characteristics for 10 miles beyond Kyzil-Ungur, where it again divides into two branches. The smallest valley rises under the snowy peaks at the head of a transverse valley of which it is a continuation; while the largest issues from a lateral valley on the w.s.w. We turned into this lateral valley, and, exhausted with fatigue, bivouacked for the night near the upper limit of the conifers at an elevation of about 7500 feet.

At 5 A.M. of the 25th June the thermometer showed 30° 5' zero. Leaving the greater part of our little caravan behind, and accompanied by Mr. Kosharof, the artist, and by two guides and five Cossacks, mounted on our best horses, I proceeded to ascertain the elevation of the Zakhk Pass. We journeyed for about 7 miles along the lateral branch of the valley without meeting any obstacles. This part of the valley, extending in a longitudinal direction relatively to the axis of the ridge, is very broad and sloping, and the river flows tranquilly through it. Crystalline formations become succeeded by the sedimentary and metamorphic, and principally by green schist; and timber vegetation, having attained its highest limit, disappears altogether. Seven miles beyond, the scenery again changes. Two branches unite here: the Zakhk, flowing from the w.s.w. and retaining the same character, and the Kashka-Su, which rushes out of a wild and narrow cross valley. We proceeded along the

latter to the southward, the ascent becoming gradually more frightful and dangerous. The impetuous stream of the Kashka-Su frequently leaps from rock to rock. Continuing our fatiguing ascent for about 3 miles we suddenly emerged on the margin of a beautiful alpine lake of emerald green. Around were piled in crowded confusion the steep escarpments of bare rocks, surmounted at an almost vertical height of 1000 or more feet by the bold indented ridges of perpendicular strata of green schist, perforated occasionally by mountain-streams, falling in silver cascades to give rise to clouds of spray on the rocks below. Behind towered the foremost crystalline chain of the Tian-Shan with its partial covering of snow. Beyond the lake the path began to ascend wild masses of rock, piled up in chaotic disorder, and forming a gigantic barrier across the valley. The character of the vegetation became entirely alpine, the bushy species reaching their limit at an elevation of 9000 feet. The species prevalent are the *Juniperus sabina* and the *Caragana jubata* aff., whose massive prickly branches project all over from between the rocks. Crossing this rocky barrier we came to another alpine lake, situated at a much higher elevation than the last. Being unable to surmount the gigantic rocky barrier described, the Kashka-Su disappears from this lake for about $1\frac{1}{4}$ mile, forcing its way through crevices and clefts below the surface. The water of the upper lake is rather turbid, but the scenery around is grand and imposing. Rocky and gigantic escarpments rise on every side of the lake except on the south-west, where an abrupt landslip of granite heaped together in chaotic confusion occurs, forming a sort of aperture or embrasure high up in the air, through which our narrow zigzag path now led. One of the giant spurs of the Tian-shan projecting from the southward towards the track we were following, terminates in a steep wall and threatens to overwhelm the traveller with its avalanches; while a natural section of its snowy covering shows its annual icy accretion so clearly that had the layers not been so numerous they might have been counted like the concentric rings in a felled tree. The horror of the scene was increased by the countless carcasses of camels, horses, oxen, sheep, goats, and dogs, that strewed the path in every direction. They occurred in thousands between the lower lake of Kashka-Su and the summit of the Zakhk Pass, stretched in every imaginable posture. This frightful picture of death was in harmony with the sublime though frightful character of the scenery and the icy atmosphere that surrounded us. We were now not more than an hour's journey from the Zakhk Pass; but the principal difficulties of the ascent were still before us. We were soon enveloped by a cloud of snow; and our horses, trembling with fear, continually stumbled over sharp stones and rocky masses, making a dead stand at the sight of each new carcass. We were at last obliged to dismount, and lead them by the bridle. The artist's horse missed its footing and precipitated its rider, who, however, fortunately escaped with a wound in his leg; my own horse likewise slipped, and cutting itself very severely, bled to death; while two of the Cossacks' animals were so utterly exhausted as to be unable to proceed any farther. And yet we had only performed half the ascent. I was soon compelled to leave behind four Cossacks and a guide; and, accompanied by Mr. Kosharof, a guide, and one of the Cossacks, pressed forward, leading four of our best remaining horses. The guide assured us that the difficulty of breathing at the summit of the Zakhk Pass was so great that existence beyond half an hour was impossible. At last we attained the object of our journey, and found ourselves on the summit of the mountain-pass, where a landscape of unexpected beauty spread out before us. We now gazed on a vast plain which, extending in every direction from us, formed a kind of broad longitudinal valley between the foremost and main ranges of the Tian-Shan. Directly in front were two lakes, covered with ice already dissolving round their edges. A rivulet flowed tranquilly from one lake to the other, and after emerging from the second, continued its gentle course to the edges of the valley, disappearing suddenly

In the gaping clefts of huge rocky masses, and ultimately reaching the upper lake of Kashka-Su in a cascade of much beauty. Beyond these lakes and some inconsiderable hillocks lay a third lake, the centre of whose surface was likewise covered with ice. Beyond these again rose a chain of snow-clad mountains which seemed no larger than hillocks, so inconsiderable appeared their elevation in comparison to that of the plateau on which we were now standing. These mountains were covered half-way down with never-melting snow. We continued our journey across the valley for 5 miles farther, reaching a third, fourth, and fifth icy lake. The third lake gives rise to a river, which, flowing due south, forces its way through the main chain of the Tian-Shan in a somewhat broad valley, presenting the appearance of an avenue between snowy hillocks. The path ran along this river, passing between snow-clad hills down the southern slope of the Tian-Shan. This river is one of the numerous affluents of the Naryn, and a similar affluent flows out of the fifth lake.

The Syr-Daria is formed by the junction of two rivers, the Naryn and Gutishan. The Naryn is longer than the Gutishan, and its affluents are more easterly. Some of these affluents, therefore, take their rise in the longitudinal valleys between the advanced and main chains of the Tian-Shan, on the northern slope of the latter; just as, farther to the eastward, the affluents of the Sary-Djaza and Aksu rivers, belonging to the water-system of the Tarim, issue from similar valleys, and force their way through the principal chain of the Tian-Shan.

These longitudinal valleys between the chief and outlying chains of the Tian-shan form, therefore, a series of reservoirs which give rise to the rivers of four distinct water-systems of Central Asia, viz., that of the Lobnor and Sea of Aral on the south, and Issyk-kul and Balkhash on the north. The rivers of the two latter systems have to force their way to the north through the advanced chain of the Tian-Shan, while those of the first two pursue their course to the southward through the main chain of those mountains.

Here I found myself in the very heart of Asia, rather nearer to Cashmere than to Semipalatinsk, to Delhi than to Omsk, to the Indian than to the Northern Ocean, and midway between the Pacific and the Euxine, in about $41\frac{1}{2}^{\circ}$ N. latitude; Kunurulen, the astronomical point at the south-western extremity of Issyk-kul, being in $42^{\circ} 17'$ N. The hypsometrical determination gave absolute elevation of 1000 feet for the Zabkū Pass and the affluents of the Naryn; the snow-line prevails about 1000 feet above this elevation. The fire which we kindled cracked and burned unequally; but I experienced no particular oppression in breathing. Around the lake flowers of the most brilliant colours and of the highest alpine zone peeped out from under the newly-fallen and dissolving snow. The flowers were of the species *Ranunculus fraterius*, *Oxygraphis glacialis*, *Dracocephalum altaicum*, a few *Pedicularis*, *Draba*, *Chrysoplegium glaciale*, *Hegemone liliacea*, &c.

I very much wished to descend the southern slope of the Tian-Shan, but was obliged to abandon the project, fearing to jeopardize the safety of the party and incur the moral responsibility of any disaster. I therefore turned unwillingly back to rejoin the men below. In two hours we again reached the border of the high plateau, and descended by a fearful path towards the upper lake of Kashka-Su, where we found our four Cossacks comfortably drinking tea round a fire. We had scarcely joined them when suddenly a terrific and rolling noise resembling successive peals of thunder resounded over our heads, causing our Kirghiz guides to flee in all directions. A huge avalanche had descended at a short distance from us, alighting fortunately a little to the side of our encampment. The sun had already set when we arrived at our encampment of the previous day, where we found our tents and the remainder of the Cossacks. On the following morning, 26th June, we descended towards Issyk-kul Lake, and passed the night in a lovely bay near the mouth of the

Kyzyl-Su. Three days after, I stood on the Kungey or northern shore of Issyk-kul Lake, and commenced exploring the high mountain-passes of the southern chain of the Trans-Ilian-Alatau.

My second journey into the heart of the Tian-Shan took me to localities of still greater interest. I succeeded in reaching the majestic and incomparable group of the Khan-Tengri, and the glaciers of the Tian-Shan, whose existence I had previously doubted. But the description of this journey I reserve for a future paper.

LIST OF THE MOUNTAIN-PASSES shown on the accompanying Map.

1. *Djungarian Alatau.*

*1. Tentek; *2. Lepsa; *3. Keissyk-Ahs (Hasford); *4. Aral-Djod; *5. Uigen-Tash; *6. Altyn-Imel.

2. *Trans-Ilian Alatau.*

*1. Almatin; *2. Keskelen; *3. Suok-Tinbé; *4. Diurenyn; 5. Koisir; *6. Oldjeiliah; *7. Chin-Balak; *8. Djaman-Bastan; *9. Seirik-Tax; *10. Tn-raigir; *11. Mai-Balak; 12. Kūdargū; *13. Kuremety; *14. Shaty; *15. Tad-bulgaty; *16. Santaah.

3. *Tian-Shan.*

*1. Zakhk; *2. Kok-Djar; *3. Tekes-Bash.

The passes visited by the author are marked with an asterisk.

XXV.—*Brief Sketch of the Results of the Issyk-kul Expedition.* By Captain A. GOLUBEV, of the Imperial Staff of Russia. Translated from the Russian by JOHN MICHELL, Esq.)

THE region extending between the Tian-Shan and Altai mountain-ranges and Balkhash plateau, which forms the north-western boundary of the elevated portion of Asia, notwithstanding its great signification in the fate of mankind, has remained hitherto almost a *terra incognita*. It is only the constantly increasing power of Russia in this direction that renders it somewhat accessible to scientific investigation.

Previous to the year 1831, in which was founded the town of Ayaguz, on the right bank of the Ayaguz, the eastern tributary of the Balkhash, we are indebted for all information regarding this region to the learned labours of Humboldt, Ritter, and others. Their information, however, was drawn either from Chinese sources or from the itineraries of traders who had penetrated into Djungaria. Although several European travellers, among whom may be mentioned the Princes Yaroslaf and Alexander Nevski, had visited the northern boundaries of Djungaria during the middle ages, they have not left any records of their journeys; and even if such accounts do exist, they throw scarcely any light on the geography of these parts.

The learned Russian travellers Sivers and Meyer, followed, in 1828, by the great Humboldt, did not penetrate farther than Tarbagatai. But, after the foundation of Ayaguz, the astronomer Fédorof succeeded, in 1834, in reaching the southern shore of Lake Balkhash, at the mouth of the Lepsa. In 1840, 41, and 42, Karélin and Schrenk effected a survey of the Semirechinsk region, a part of Djungaria between the river Ili, Djungarian Alatau, and Lake Balkhash. In 1851 Kovalefski performed a journey to Kuldja—an important result of this mission being the consolidation of friendly relations between Russia and China on the west.

It was not until the construction of Fort Vernoe, in 1855, at the northern

base of the Trans-Ilian Alatau, that Russian scientific travellers were enabled to penetrate into the Trans-Ilian region, a part of Djungaria stretching from the river Ili to the Tian-Shan range. In 1838 the Russian topographical surveys extended as far as the southern shore of Lake Issyk-kul; and it was during this year that M. Semenov visited the Tian-Shan mountains, being the first European who had ever ascended them.

The region at present under consideration had long since been surveyed, and many of its points astronomically determined. After the conquest of Djungaria by China, in the reign of Tsian-lun, a learned commission, under the superintendence of European missionaries, was appointed for the construction of maps of the annexed countries. It is to the learned labours of M. Zakharof in particular, who, when at Peking, had access to sources not available to all, that we are indebted for the list of places astronomically fixed by this commission. These determinations, however, were made in the middle of the last century; besides, the instruments used and the methods pursued are unknown, we having thus merely bare results, which are of course beyond all criticism. Their correctness, therefore, can justly be doubted. Moreover, in the western portion of this region, formed by the present Russian districts of Ayaguz, Kapal, and Alatau, we are only acquainted with two points—one at the mouth of the Kumor-ulen, at its fall into Lake Issyk-kul on the south-west; and the other, on the Karatal, in the Kapal district.

Seeing the necessity of verifying the Chinese determinations, and in the absence of all data for constructing a correct map of Russian Djungaria, the Russian Topographical Department, in conjunction with the Imperial Geographical Society, organised a new expedition in 1859, with the view of filling up the existing blanks on the map of the above region. The direction of this expedition was entrusted to me; and, having now terminated it, I present a brief sketch of my labours.

On the 22nd April I proceeded from Fort Vernoe towards the eastern shore of Lake Issyk-kul, under the guard of a strong military escort. A detachment of Russian troops was at that time stationed at the mouth of the Tiuba for the defence of the tribe of the Kara-Kirghiz Bogus against the depredations of the Sary-Bagishes, as also with the object of affording protection to a Russian caravan which was then returning from Kashgar. My instructions were to join this detachment at the lake, and continue my journey under its escort. Seeing, however, the dangerous position of the detachment, which was surrounded by the Sary-Bagishes, who, perceiving its weakness, assumed a threatening attitude, I advised the commanding officer not to wait for me at the lake.

Crossing the river Tchilik, and the small mountain-passes Tash, Air (6300 ft. in absolute elevation), and Tirk-Tash, I reached, on the 4th May, the elevated plateau of Karakara (5900 ft. in elevation), where I joined the detachment which had returned from the lake. But, even with this addition to my force, which now consisted of 100 Cossacks, on the advice of those acquainted with the character of the Kara-Kirghizes, I resolved to await a further reinforcement before proceeding to the lake.

The shores of the lake were at that time occupied by the Sary-Bagishes, who were in pursuit of their foes the Bogus; while the latter, on whose friendship we could rely, were encamped at a considerable distance within the Chinese boundaries, on the banks of the river Tekes. A rumour had likewise spread that the Sary-Bagish tribe had summoned the Kokanians to their aid; this report we subsequently found to be correct; for, on reaching the lake, we met the last small party of Kokanians returning homewards, after having collected tribute from the Sary-Bagish tribe.

While expecting the arrival of a reinforcement from Vernoe, I resolved to visit the village of Sumbé. Leaving a part of my escort, therefore, at Karakara to guard the camels and luggage, I started thither on the 6th May. Proceeding

first along the Kegen valley, then passing the salt lake of Borodabsun-nor, I journeyed through valleys of the Kara-tau range, and reached Sumbé on the 10th May. Sumbé is situated on the river Sumbé, or Alvan, falling into the Tekès: a small Buddhist monastery stands among the hills on a high plateau (7200 feet in elevation), and is held in great veneration in the neighbourhood. On my way to Sumbé I first caught sight of the Tian-Shan; and from the Sumbé plateau, in the morning, I could see the Tenggri-Khan, the gigantic peak of the Tian-Shan. The height of this peak, at an approximate calculation, is not less than 21,000 feet.

Leaving Sumbé, we arrived at the banks of the river Tekès. The broad valley of this river, elevated 5700 feet above the level of the sea, and abundantly watered, affords excellent pasturage. It was at that time filled with legions; beyond them, at the foot of the Tian-Shan, was an encampment of Calmucks; while still farther on appeared a Chinese picket, and a road leading to the Mussart Pass. From hence I returned by the same road to Karkara, which place I reached on the 16th May.

I selected the mouth of the river Karkara, at its fall into the Kegen, flowing on our frontier with China, as an astronomical point, connecting it with Sumbé village and a point on the banks of the Tekès, where the latter river receives the Mussart. The mouth of the Karkara I intended to unite with a point on the eastern shore of Issyk-kul Lake, and which I subsequently effected.

On my return to Karkara I found the expected reinforcement, and started for the lake. On the 19th May we crossed the Santash Pass, celebrated for the legend connected with Tamerlane's expedition, and arrived at the lake on the 21st May. We encamped at the mouth of the Tiuba, near Isabeg's tomb, a spot affording safe pasturage for our horses, and protected more than any other from a sudden attack. This part of the Tiuba, at its embouchure into the lake, I selected for an astronomical point; and, wishing to connect it with the point mentioned on the Karkara plateau, I proceeded to the latter place, from whence I returned again to the lake on the 27th May. The mouth of the Tiuba I proposed to connect with the chief point in the Trans-Ili region, together with Fort Vernoe. With this view I left the lake with a small escort on the 29th May, and reached Vernoe on the 3rd June. On the 11th I again returned back to the mouth of the Tiuba.

On my onward journey I crossed the mountain-passes of Tobulgut, Tchon-bulak, and Turgen. The two first were still covered with snow, particularly Tchon-bulak, whose height is 10,400 feet. Returning, I took the shortest route through the Turgen, Tchon-bulak, and Kurmety Passes; the latter is covered with perpetual snows, and is one of the most difficult to traverse of the whole Trans-Iliian Alatau: its height I estimate at 13,000 feet.

We started early in the morning with the intention of clearing the Kurmety Pass. We first descended from the elevated Dalashik plateau (7900 feet high) in the direction of the Tchilik River, whose banks are very precipitous: it was with great difficulty that we succeeded in fording this very rapid and deep stream. Crossing the Tchilik, we proceeded up a cleft in the mountains, skirting first the Shenota, and then the Kurmety. The pathway did not present many obstacles at first; farther on, however, we encountered considerable difficulty in clearing the barriers of timber which the Kirghizes had thrown up to arrest the progress of the "Barauta" or pillaging parties. Ascending higher, we began to suffer from cold, and soon reached the snows. The path gradually became more impassable, and the landslips more precipitous;—deceived by the surface of the snow, our horses frequently fell through large crevices between the crags. A fog prevailing at the time rendered our journey all the more tedious.

At the watershed the path trends to the summit of the peak, being bordered by huge masses of snow which conceal the chasms. After great labour and fatigue we at last gained the peak, and then commenced our descent to the lake along the Kurmety stream. The descent, which is difficult even at first,

becomes extremely fatiguing towards the end of the valley. Great rocks impede the traveller at every step, and compel him to dismount continually in order to pass between them. Late in the evening at last we reached the head of the valley; and passed the night in a cave pointed out to us by one of the Kirghiz guides. On the following day I joined the detachment which was waiting for me at the mouth of the Tiuba.

From hence I started along the northern shore of the lake, and arrived on the 20th June at the mouth of the Kutemaldy River, on its western extremity. I must here observe that a strong detachment, consisting of infantry, Cossacks, and artillery, had been despatched a little before from Fort Vernoe to make a military survey of the banks of the Tchu River. This circumstance had alarmed the Sary-Bagish, and made them decamp from the northern shore of the lake to the southern. The greater part of the tribe migrated beyond the Djirgala River, on the south-east shore of the lake; while the other fled beyond the Kutemaldy, on the south-western. I was, therefore, enabled to proceed along the northern shore in perfect security.

The mouth of the Kutemaldy River was determined astronomically, its longitude I likewise ascertained by transporting the chronometers from the Tiuba. Astronomical observations give the magnitude of the arc from the eastern extremity of the lake, at the mouth of the Tiuba, to its western point at Kutemaldy, at $2^{\circ} 32' 4''$, or at 161, 4 versts (about 107 miles). The greatest breadth of the lake is 50 versts (30 miles), its area being 120 square miles, and receives into itself 72 rivers.

Confined within the greatest mountain-ranges in the world, the lake is elevated 5200 feet above the level of the sea, while beyond the Alatau, at a distance of 63 miles, is Vernoe, situated 2700 feet below the lake. The name of Issyk-kul (Warm Lake) and Tuz-kel (Salt Lake) is strictly correct: its surface never freezes, but the rivulets falling into it become covered with ice for nearly three months during the year. I did not find a great difference between the temperature of the water of the lake, and of the air; in the rivulets flowing into the lake it never exceeded 11° Reaumur. Their waters are salt but not unpalatable.

The river Tchu, which here bears the name of Kashkara, runs a few miles west of the lake. Between this river and the lake is the Kutemaldy channel, excavated at a very distant period. The water in it is nearly stagnant, and the barometrical levelling did not show any perceptible difference between the levels of the lake and Tchu.

On the southern shore of Issyk-kul, at a journey's distance from Kutemaldy, flows the Konur-Ulen rivulet; the astronomical point determined in the last century by the Jesuit missionaries is situated on it,—in all probability near its mouth.

Wishing to get back to Vernoe, and the detachment which had been despatched to make a military reconnaissance on the Tchu River having returned, I left Kutemaldy on the 22nd June; clearing the Turaigir and Duré-assy passes, we descended to the Kebin River, an affluent of the Tchu, and then penetrated across the northern chain of the Trans-Iliian Alatau by the Keskelen Pass. Both the Duré-assy and Keskelen passes, the height of the latter being 12,400 feet, are snowy and difficult. We lost seven camels in these passes: the poor animals, exhausted with fatigue from the previous journeys were unable to proceed farther; the Kirghizes were therefore compelled to kill them out of compassion. It is in this manner that every difficult mountain-pass is strewn with the carcases of animals, and the birds of prey which hover near them serve as a guide to the traveller who has lost his way.

On the 25th June I arrived at Vernoe, and proceeded from thence to determine the position of the newly established Russian fort of Kastek, situated about 63 miles west of Vernoe.

This effected, I determined the position of the Ili Fort, on the left bank of the Ili.

This terminated my labours in the Trans-Iliu region.

The eight points astronomically determined by me are:—

1, Fort Vernoe; 2, mouth of Karkara River and Kegen River; 3, Sumtd Monastery; 4, Point on Tekes River; 5, mouth of Tiuba River at Issyk-kul; 6, mouth of Kutemaldy at Issyk-kul; 7, Fort Kaatek; 8, Fort-III.

The approximate co-ordinates of Vernoe and of the extremities of the lake are:

	Longitude East of Ferro.	North Latitude.
Vernoe	24° 45'	43° 15' 5"
Eastern extremity of lake at mouth of Tiuba	96° 1'	42° 42' 5"
Western extremity of lake at mouth of Kutemaldy	93° 57'	42° 24' 2"

I must here observe that the map of 1855 founded on our topographical surveys shows Vernoe under 95° longitude from Ferro, making a difference only of 15' in the arc, or one minute of time. Mr. Zakharof's map which is at present considered the best, gives the longitude of Vernoe at 95½°, an error of 3 minutes. Mr. Zakharof's map is compiled from Chinese sources, but in what manner they were elaborated has not been ascertained.

On the 1st August I left Vernoe for the town of Kapal. I chose this place for a fundamental point in the Semirechinsk region, and determined its longitude absolutely. On the road I took observations at Altynimelsk Picket and Koks Settlement, returning from Kapal again to Koks.

According to my instructions I was to visit the Chinese town of Kuldja. Our Consul, Mr. Zakharof, had not, however, arrived there yet; but the season being advanced, I resolved to lose no time in waiting for his arrival, as the mountain-passes leading from Kuldja through the Djungarian Alatau are extremely difficult to traverse in autumn. I started, therefore, from Koks to Kuldja with a party in charge of silver for our factory at the latter place.

Clearing the Yogen-Tash mountain-pass and Karasai defile we arrived at the first Chinese picket of Borogudjir. From here we received fresh guides at each picket, and following the shortest upper route, reached Kuldja on the 18th August. This town is situated on the right bank of the Ili, and has about 70,000 inhabitants, a considerable market, and is the seat of the residence of the Kee Roy or Tsan-Tsun.

My observations determined the position of the Russian factory at Kuldja in 43° 55' 5" latitude and 3° 54' east longitude from Vernoe, or 98° 39' from Ferro, which result again differs from Mr. Zakharof's maps. During my short residence in the town a sufficiently correct plan of it was taken by Mr. Matkof, the topographer who accompanied me throughout the expedition.

On the 23rd August I left Kuldja by the old route, determining the position of Borogudjir picket on the way. On the 30th August I made an excursion to Verkh-Lepinsk, or Tchuhar-Agateh, to determine the position of this settlement. In this excursion I determined the following six points:—

1, Town of Kapal; 2, Altynimel Picket; 3, Koks Settlement; 4, Kuldja; 5, Borogudjir Picket; 6, Tchuhar-Agateh Settlement.

Two points still remained to be fixed: Udjat Station in the Ayaguz district, and the Chinese town of Tchuguchak. These I proposed to connect with the town of Ayaguz, which had already been determined by Astronomer Fedorof.

A severe illness detained me a considerable time at Kapal, and it was consequently only in the middle of October that I could proceed to Ayaguz, which I reached on the 18th of the month; from Ayaguz I started on the 20th to Udjat Station, from thence farther on to the town of Tchuguchak. I returned to Ayaguz on the 29th October, adding thus two more points to those already fixed, they are:—1, Udjat Station; 2, Tchuguchak.

This terminated the expedition.

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